TOSHIBA

FILE NO. 110-200019

SERVICE MANUAL
NC MECHANICAL DECK

VIDEO CASSETTE RECORDER

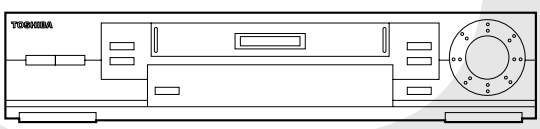
W-707

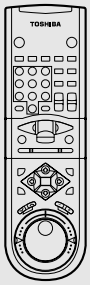
General Descriptions

Adjustment Procedures

Servicing diagrams

Part List





Aug., 2000 Ⓨ

SAFETY NOTICE

SAFETY PRECAUTIONS

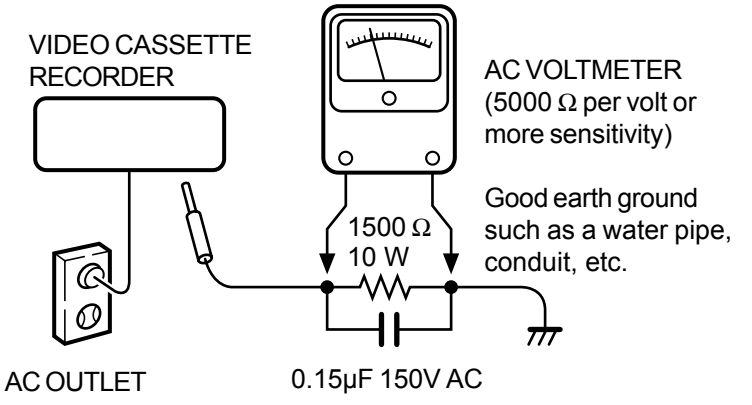
LEAKAGE CURRENT CHECK

Plug the AC line cord directly into a 120V AC outlet (do not use an isolation transformer for this check). Use an AC Voltmeter, having 5000 Ω per volt or more sensitivity. Connect a 1500 Ω 10 W resistor, paralleled by a 0.15 µF 150V AC capacitor between a known good earth ground (water pipe, conduit, etc.) and all exposed metal parts of cabinet (antennas, handle bracket, metal cabinet, screwheads, metal overlays, control shafts, etc.).

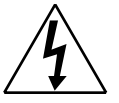
Measure the AC voltage across the 1500 Ω resistor. The test must be conducted with the AC switch on and then repeated with the AC switch off. The AC voltage indicated by the meter may not exceed 0.3 V. A reading exceeding 0.3 V indicates that a dangerous potential exists, the fault must be located and corrected. Repeat the above test with the VCR power plug reversed.

NEVER RETURN A VCR TO THE CUSTOMER WITHOUT TAKING NECESSARY CORRECTIVE ACTION.

READING SHOULD NOT EXCEED 0.3V



Test all exposed metal.
Voltmeter Hook-up for Leakage Current Check



The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of uninsulated “dangerous voltage” within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

SECTION 1
GENERAL DESCRIPTIONS

1. OWNER'S MANUAL

TOSHIBA

Hi-Fi VHS

Video Cassette Recorder

W-707

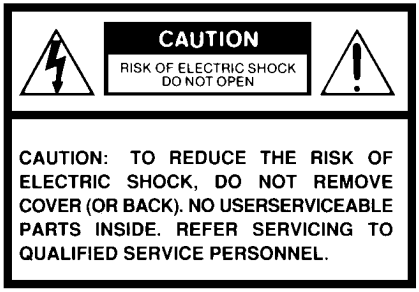
OWNER'S MANUAL

VCR Plus+ 3 SQPB CABLE BOX CONTROL

This publication is printed on recycled paper

70971855

SAFETY PRECAUTIONS


CAUTION
RISK OF ELECTRIC SHOCK
DO NOT OPEN
CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER (OR BACK). NO USERSERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.

The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of uninsulated “dangerous voltage” within the product’s enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

WARNING: TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE. DANGEROUS HIGH VOLTAGES ARE PRESENT INSIDE THE ENCLOSURE. DO NOT OPEN THE CABINET. REFER SERVICING TO QUALIFIED PERSONNEL ONLY.

CAUTION: TO PREVENT ELECTRIC SHOCK, MATCH WIDE BLADE OF PLUG TO WIDE SLOT, FULLY INSERT.

Product Name: Video Cassette Recorder
Model Number: W-707

FCC Notice: “Declaration of Conformity”

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Contact: Toshiba America Consumer Products, Inc.
Address: 1420 Toshiba Drive, Lebanon, TN37087
Telephone: 615-449-2360

User Installer Caution: Changes or modification made to this equipment not expressly approved by Toshiba Corporation or parties authorized by Toshiba Corporation could void the user’s authority to operate the equipment.

Note to CATV system installer:
This reminder is provided to call the CATV system installer’s attention to Article 820-40 of the NEC that provides guidelines for proper grounding and, in particular, specifies that the cable ground shall be connected to the grounding system of the building, as close to the point of cable entry as practical.

IMPORTANT PRECAUTIONS

Save Original Packing Materials

The original shipping carton and packing materials will come in handy if you ever have to ship your VCR. For maximum protection, repack the set as it was originally packed at the factory.

Avoid Volatile Liquid

Do not use volatile liquids, such as an insect spray, near the unit.
Do not leave rubber or plastic products touching the unit for a long time. They will mar the finish.

Moisture Condensation

Never operate this unit immediately after moving it from a cold location to a warm location. When the VCR is exposed to such a change in temperature, moisture may condense on the cylinder inside, one of its most crucial internal parts. To prevent the VCR from possible damage, do not use the unit for at least 2 hours when there is an extreme or sudden change in temperature.

Compatibility

This video cassette recorder (VCR) is compatible with any other VCR bearing the VHS mark. HQ VHS equipment is also compatible with existing, non-HQ VHS equipment.

Copyright

It is permissible to record television programs, film, video tapes and other material only in the event that third party copyrights and other rights are not violated.

As an ENERGY STAR® Partner, TOSHIBA has determined that this product or product model meets the ENERGY STAR® guidelines for energy efficiency.

In the spaces provided below, record the Model and Serial No. located at the rear of your video cassette recorder.

Model No. _____ Serial No. _____

Retain this information for future reference.

IMPORTANT SAFETY INSTRUCTIONS

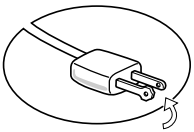
CAUTION: PLEASE READ AND OBSERVE ALL WARNINGS AND INSTRUCTIONS GIVEN IN THIS OWNER'S MANUAL AND THOSE MARKED ON THE UNIT. RETAIN THIS BOOKLET FOR FUTURE REFERENCE.

This set has been designed and manufactured to assure personal safety. Improper use can result in electric shock or fire hazard. The safeguards incorporated in this unit will protect you if you observe the following procedures for installation, use and servicing. This unit is fully transistorized and does not contain any parts that can be repaired by the user.
DO NOT REMOVE THE CABINET COVER, OR YOU MAY BE EXPOSED TO DANGEROUS VOLTAGE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL ONLY.

1. Read owner's manual
After unpacking this product, read the owner's manual carefully, and follow all the operating and other instructions.

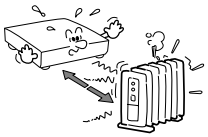
2. Power Sources
This product should be operated only from the type of power source indicated on the marking label. If you are not sure of the type of power supply to your home, consult your product dealer or local power company. For products intended to operate from battery power, or other sources, refer to the operating instructions.

3. Grounding or Polarization
This product may be equipped with a polarized alternating current line plug (a plug having one blade wider than the other). This plug will fit into the power outlet only one way. This is a safety feature. If you are unable to insert the plug fully into the outlet, try reversing the plug. If the plug should still fail to fit, contact your electrician to replace your obsolete outlet. Do not defeat the safety purpose of the polarized plug.



4. Ventilation
Slots and openings in the cabinet are provided for ventilation and to ensure reliable operation of the product and to protect it from overheating, and these openings must not be blocked or covered. The openings should never be blocked by placing the product on a bed, sofa, rug or other similar surface. This product should not be placed in a built-in installation such as a bookcase or rack unless proper ventilation is provided or the manufacturer's instructions have been adhered to.

5. Heat
The product should be situated away from heat sources such as radiators, heat registers, stoves, or other products (including amplifiers) that produce heat.



6. Water and Moisture
Do not use this product near water - for example, near a bath tub, wash bowl, kitchen sink, or laundry tub; in a wet basement; or near a swimming pool and the like.

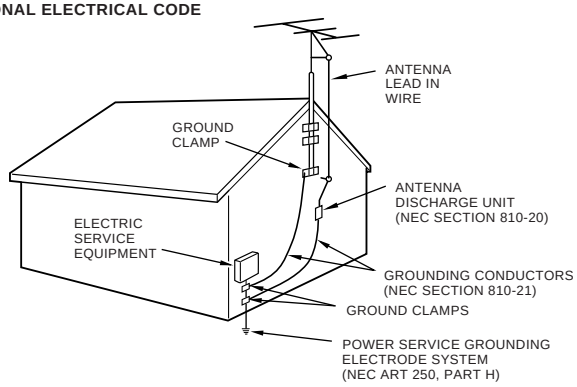
7. Cleaning
Unplug this product from the wall outlet before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a damp cloth for cleaning.

8. Power-Cord Protection
Power-supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them, paying particular attention to cords at plugs, convenience receptacles, and the point where they exit from the product.

9. Overloading
Do not overload wall outlets; extension cords, or integral convenience receptacles as this can result in a risk of fire or electric shock.

10. Outdoor Antenna Grounding
If an outside antenna or cable system is connected to the product, be sure the antenna or cable system is grounded so as to provide some protection against voltage surges and built-up static charges. Article 810 of the National Electrical Code, ANSI/NFPA 70, provides information with regard to proper grounding of the mast and supporting structure, grounding of the lead-in wire to an antenna discharge unit, size of grounding conductors, location of antenna-discharge unit, connection to grounding electrodes, and requirements for the grounding electrode.

EXAMPLE OF ANTENNA GROUNDING AS PER NATIONAL ELECTRICAL CODE


ANTENNA LEAD IN WIRE
GROUND CLAMP
ANTENNA DISCHARGE UNIT (NEC SECTION 810-20)
ELECTRIC SERVICE EQUIPMENT
GROUNDING CONDUCTORS (NEC SECTION 810-21)
GROUND CLAMPS
POWER SERVICE GROUNDING ELECTRODE SYSTEM (NEC ART 250, PART H)

NEC – NATIONAL ELECTRICAL CODE

S2898A

11. Power Lines
An outside antenna system should not be located in the vicinity of overhead power lines or other electric light or power circuits, or where it can fall into such power lines or circuits. When installing an outside antenna system, extreme care should be taken to keep from touching such power lines or circuits as contact with them might be fatal.

IMPORTANT SAFETY INSTRUCTIONS

12. Lightning
For added protection for this product during storm, or when it is left unattended and unused for long periods of time, unplug it from the wall outlet and disconnect the antenna or cable system. This will prevent damage to the product due to lightning and power-line surges.

13. Object and Liquid Entry
Never push objects of any kind into this product through openings as they may touch dangerous voltage points or short-out parts that could result in a fire or electric shock. Never spill liquid of any kind on the product.

14. Attachments
Do not use attachments not recommended by the product manufacturer as they may cause hazards.

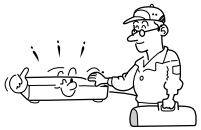
15. Accessories
Do not place this product on an unstable cart, stand, tripod, bracket, or table. The product may fall, causing serious injury to a child or adult, and serious damage to the product. Use only with a cart, stand, tripod, bracket, or table recommended by the manufacturer, or sold with the product. Any mounting of the product should follow the manufacturer's instructions, and should use a mounting accessory recommended by the manufacturer.
A product and cart combination should be moved with care. Quick stops, excessive force, and uneven surfaces may cause the product and cart combination to overturn.

16. Damage Requiring Service
Unplug this product from the wall outlet and refer servicing to qualified service personnel under the following conditions:
a) When the power-supply cord or plug is damaged.
b) If liquid has been spilled, or objects have fallen into the product.
c) If the product has been exposed to rain or water.
d) If the product does not operate normally by following the operating instructions. Adjust only those controls that are covered by the operating instructions as an improper adjustment of other controls may result in damage and will often require extensive work by a qualified technician to restore the product to its normal operation.
e) If the product has been dropped or damaged in any way.
f) When the product exhibits a distinct change in performance - this indicates a need for service.

17. Servicing
Do not attempt to service this product yourself as opening or removing covers may expose you to dangerous voltage or other hazards. Refer all servicing to qualified service personnel.

18. Replacement Parts
When replacement parts are required, be sure the service technician has used replacement parts specified by the manufacturer or have the same characteristics as the original part. Unauthorized substitutions may result in fire, electric shock, or other hazards.

19. Safety Check
Upon completion of any service or repairs to this product, ask the service technician to perform safety checks to determine that the product is in proper operating condition.



Contents

INTRODUCTION

Provides important notes and general explanation of the VCR, including names of the buttons, jacks, etc.

SAFETY PRECAUTIONS 2

IMPORTANT PRECAUTIONS 3

IMPORTANT SAFETY INSTRUCTIONS 4

Contents 7

Identification of Controls 8

- Front Panel
- Remote Control
- VCR Display
- Rear Panel

PREPARATION

Explains what you need to do before operating the VCR.

How to Use the Remote Control 10

Connections 11

Auto Set Up 14

Initial Settings Using On-screen Display 15

- Setting the Language
- Optional settings on the SET UP screen
- Setting the Clock

Storing Channels on the VCR 17

Video Cassette Use 19

PLAYBACK

Explains variable functions concerning playback.

Playback 20

- 19μ HEAD

Variable Speed Playback 21

- Picture Search
- Still Picture
- Slow-motion Picture
- Frame Advance
- Double Speed Playback
- Jog Dial Operation
- Shuttle Dial Operation

Useful Functions in Tape Operation 23

- Counter Function
- Tape Remaining Time
- Index Search Function

RECORDING

Explains recording functions.

Recording a TV Program 25

- Watching a TV program while recording another
- Recording off time setting

Timer Program Recording 26

VCR Plus+ C³® system Set-up 29

VCR Plus+ C³® system Recording .. 31

Cable Box Set-up 33

DSS® Satellite Receiver Set-up 37

MTS Broadcast Compatibility 40

Simulcast Recording 41

ADDITIONAL INFORMATION

Multi Brand Remote Control 42

Before Calling Service Personnel ... 44

Specifications 46

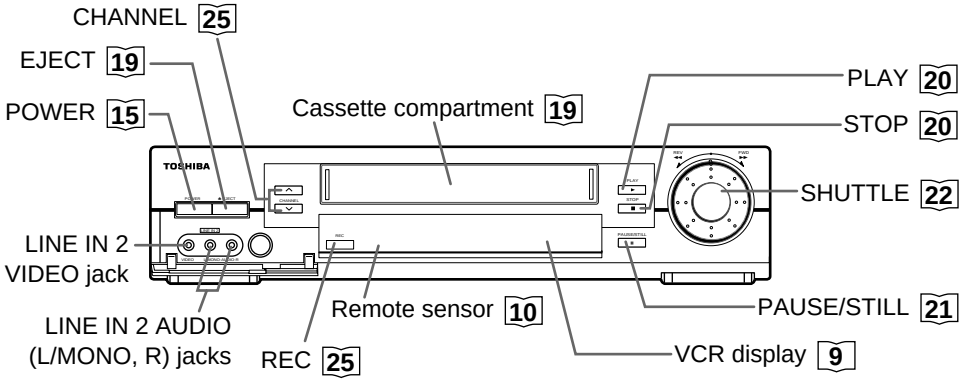
Accessories 46

LIMITED WARRANTY 47

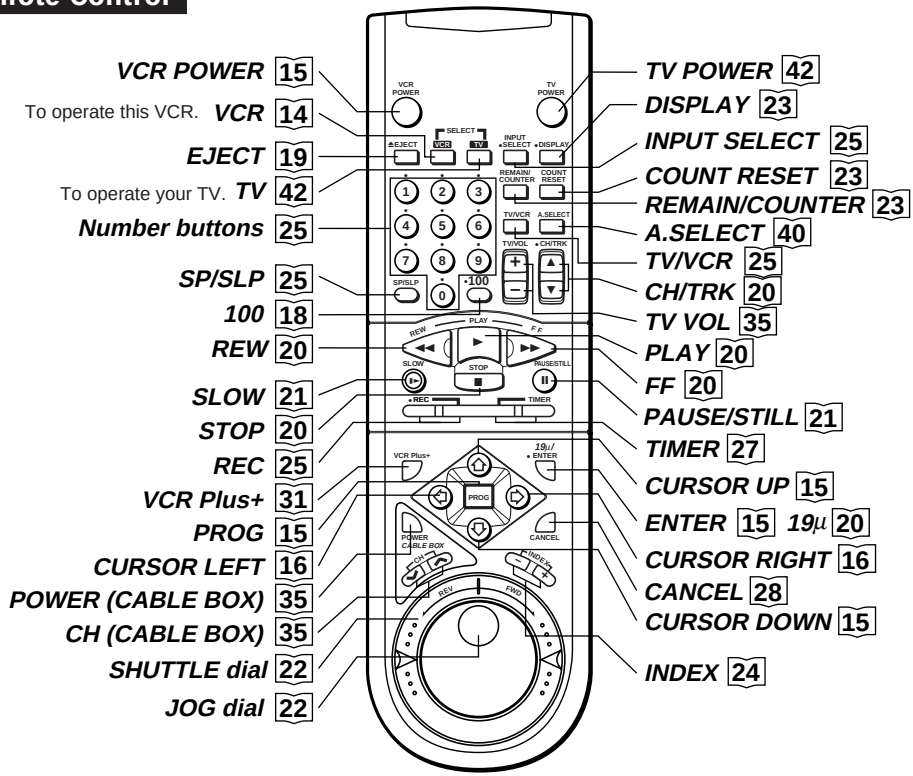
Identification of Controls

See the page in ☐ for details.
This manual shows the names of buttons in italics.

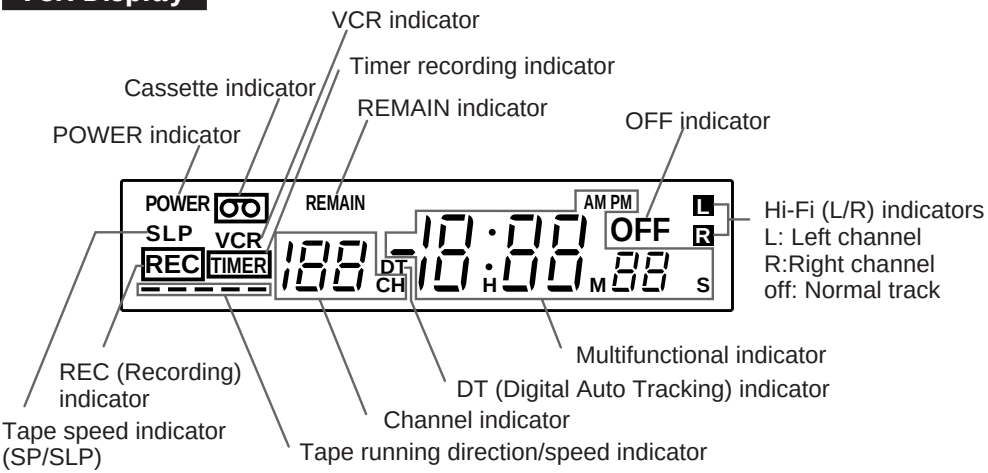
Front Panel



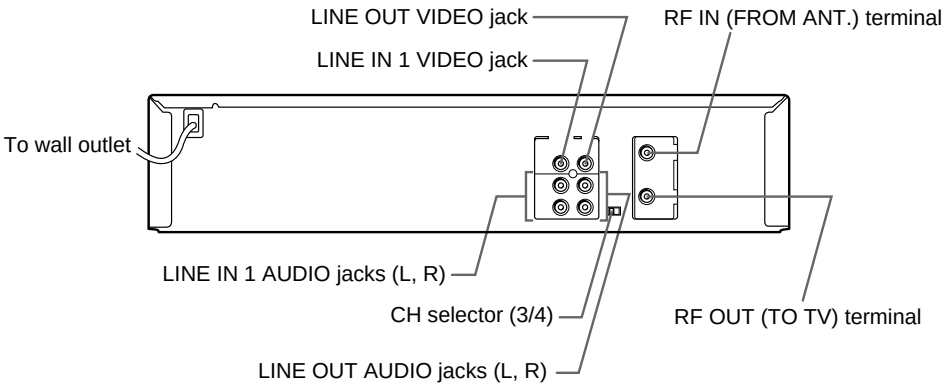
Remote Control



VCR Display



Rear Panel


LINE OUT VIDEO jack
RF IN (FROM ANT.) terminal
LINE IN 1 VIDEO jack
To wall outlet
LINE IN 1 AUDIO jacks (L, R)
CH selector (3/4)
RF OUT (TO TV) terminal
LINE OUT AUDIO jacks (L, R)

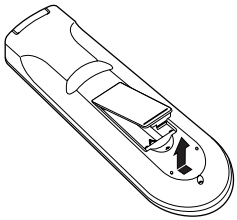
LINE IN 1 AUDIO (Rear), 2 (Front) jacks
If the connected equipment is monaural (has one audio output jack), connect the L (MONO) side, the same sound is recorded on both L and R on the Hi-Fi track.

How to Use the Remote Control

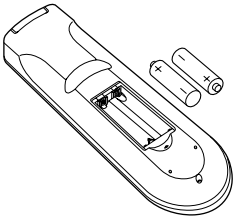
This section explains how to get ready for remote control operation.

Setting up the Remote Control

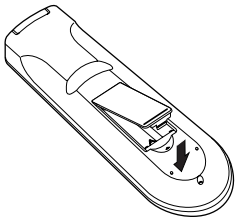
1 Open the battery compartment lid on the rear panel.



2 Install 2 batteries (“AAA” size) following the polarity diagrams.



3 Close the battery compartment lid.



4 Point the remote control at the VCR and press the buttons within the operating range.

Distance: within about 7 m from the front of the remote sensor

Angles: within about 30˚ in every direction

Notes on batteries

- The life of the batteries is about 1 year depending on the conditions of use.
- If the remote control does not operate correctly, replace all batteries with new ones.
- If the remote control is not to be used for a long period of time, remove the batteries to avoid possible damage from battery corrosion.

Caring for the remote control

- Do not expose the remote sensor of the VCR to a strong light source such as direct sunlight or illumination (especially high-frequency lighting) when using the remote control.
- Be careful not to spill water on the remote control or to place it on anything wet, and avoid sharp impacts.

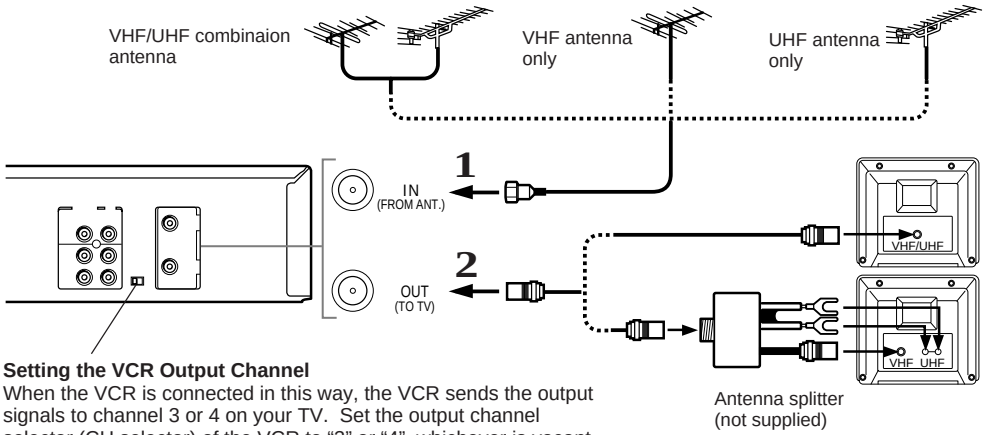
Connections

Before you use this VCR, it is necessary to connect it to your TV. Several ways of connecting are available depending on your use of TV or cable box. Select one which is applicable to your equipment.

Antenna/VCR/TV Connection

1 Disconnect the antenna cable from your TV and connect it to the **RF IN** terminal on the VCR.

2 Connect the **RF OUT** terminal to the TV.

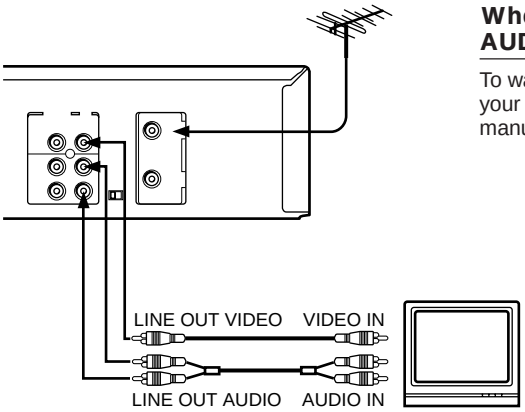


Setting the VCR Output Channel
When the VCR is connected in this way, the VCR sends the output signals to channel 3 or 4 on your TV. Set the output channel selector (CH selector) of the VCR to "3" or "4", whichever is vacant in your area.

Antenna splitter (not supplied)

AUDIO/VIDEO Connections

The AUDIO/VIDEO jacks are also available to connect your TV.

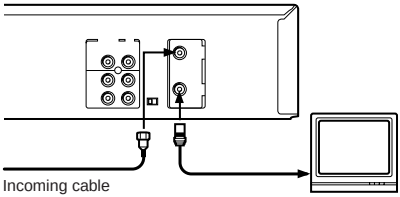


When connected your TV using the AUDIO/VIDEO OUT jacks

To watch video pictures, set the video input mode on your TV. For the video input mode, refer to the manual of your TV.

Cable Connection

Choose one of the below according to your usage of the cable box.

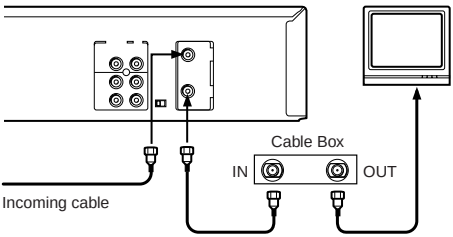


This set-up will enable you to:

– record an unscrambled channel.
– watch an unscrambled channel while recording it.
– record an unscrambled channel while watching another (only when you connect a cable-compatible TV).

You will need to:

- select TV channel 3 or 4 to receive video signals. (See page 11.)
- to record a channel while watching another, press ***TV/VCR*** on the remote control to turn off the "VCR" indicator in the VCR display and select a desired channel on the TV (only when you connect a cable-compatible TV).

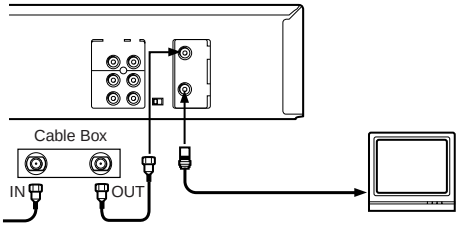


This set-up will enable you to:

– record an unscrambled channel.
– watch an unscrambled channel while recording it.
– record an unscrambled channel while watching another (scrambled or unscrambled).

You will need to:

- set TV channel to the output channel of the cable box.
- turn on the cable box and select cable channel 3 or 4 according to the output channel of the VCR.
- to record a channel while watching another, press ***TV/VCR*** on the remote control to turn off the "VCR" indicator in the VCR display and select a desired cable channel on the cable box.

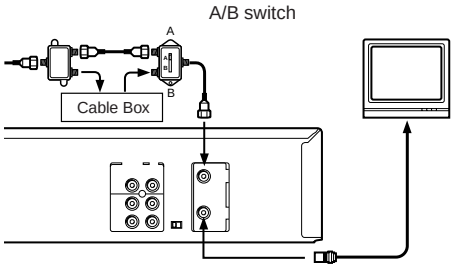


This set-up will enable you to:

– watch an unscrambled or scrambled channel while recording it.
– record any channels through the cable box.

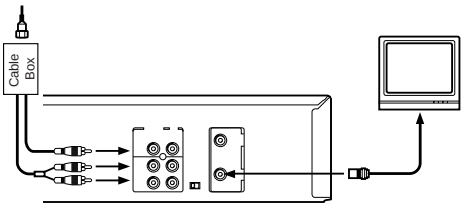
You will need to:

- set TV channel 3 or 4 to receive video signals. (See page 11.)
- set VCR channel to the output channel of the cable box, and select a desired cable channel on the cable box.
- while the VCR is turned off or the "VCR" indicator is not lit in the VCR display, set TV channel to the output channel of the cable box.



This set-up will enable you to:

– watch an unscrambled or scrambled channel while recording it.
– record an unscrambled channel while watching another unscrambled channel (only when you connect a cable-compatible TV).
- A/B switch "A": record and watch an unscrambled channel which comes bypassing the cable box.
- A/B switch "B": record and watch a scrambled or unscrambled channel coming through the cable box.



This set-up will enable you to:

– watch or record a channel through the cable box via the LINE IN 1 (AUDIO/VIDEO) jacks.

You will need to:

- press ***INPUT SELECT*** so that the VCR display shows "L1".

Auto Set Up

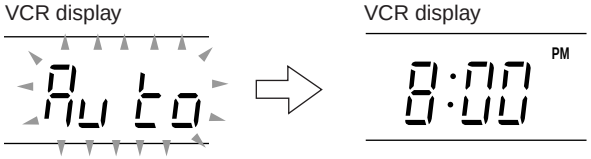
The Auto Set Up function automatically sets the tuner channels and clock when power is first connected to the VCR.

Preparation

- Turn on the TV, and select the video channel (3 or 4), or the video input mode if you made the Audio/Video connection (page 11).
- Press *INPUT SELECT* so that the channel number will appear if "L1" or "L2" is displayed in the VCR display.
- **Press *VCR* to set the remote control operating the VCR.**

Auto Set Up

1 Connect the antenna cable to the VCR (see page 11). Then connect the VCR's power plug to an AC outlet.
"Auto" flashes in the VCR display as the VCR automatically tunes in all active stations. When Auto Set Up is completed successfully, the current time will be displayed.



- If the VCR fails to set the clock, "– : – –" will be displayed. Set the clock manually. (Refer to "Setting the clock" on page 16.)

Notes

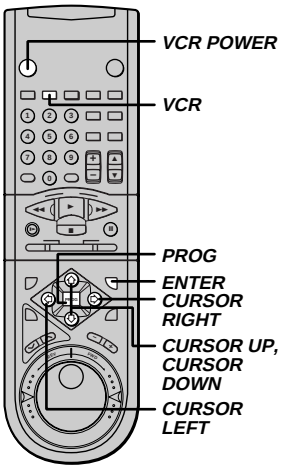
- If you press the *CANCEL* button, the Auto Set Up is cancelled.
- If Auto Set Up is not perform successfully, perform the clock and Tuner Channel procedures manually (page 16 to 18).
- If, however, you want to add or delete channels, refer to "Adding or erasing channels" on page 18.

Initial Settings Using On-screen Display

Language selection must be set first when the VCR is first plugged in, or after it encounters a power failure. You can also easily make necessary settings using the on-screen displays.

Preparation

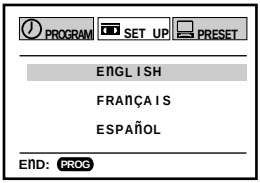
- Turn on the TV, and select the video channel (3 or 4), or the video input mode if you made the Audio/Video connection (page 11).
- **Press *VCR* to set the remote control operating the VCR.**



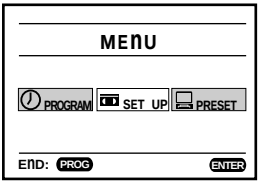
Setting the Language

1 Press ***VCR POWER*** to turn on the VCR.

2 Press ***PROG***.
The following screen appears on the TV.



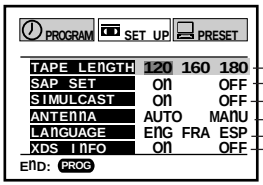
3 Select the language using ***CURSOR UP*** or ***CURSOR DOWN***, and press ***PROG***.
The screen turns to the MENU screen.



4 Press ***PROG*** to return to the normal TV screen.

Optional settings on the SET UP screen

Other optional settings can be made. Press ***ENTER*** while “SET UP” is selected on the MENU screen. The screen turns to the SET UP screen.



- TAPE LENGTH — Page 23
- SAP SET — Page 40
- SIMULCAST — Page 41
- ANTENNA — With “AUTO” set, a TV broadcast will appear via the TV tuner after playback. Move down here, and set to “AUTO” or “MANU”. If you made the Audio/Video connection (page 11), set to “MANU”.
- LANGUAGE — To change the language, move down here and set to the desired one.
- XDS INFO — With “ON” set, you can see the station ID and program title displayed on TV.

To exit, press ***PROG***.

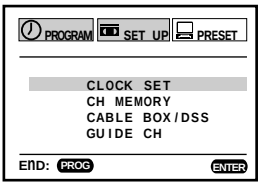
(Continued)

Setting the Clock

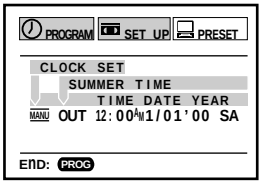
Example: To set the clock to 2:30 p.m. on August 25 (summer time) 2000.

Press ***PROG***.
The MENU screen appears on the TV.

Select "PRESET" using ***CURSOR RIGHT*** or ***CURSOR LEFT***, and press ***ENTER***.



Press ***ENTER*** to select "CLOCK SET".



Select "AUTO" or "MANU" using ***CURSOR UP*** or ***CURSOR DOWN***.

AUTO: The VCR automatically sets or adjusts the clock.

If you select "AUTO" mode, proceed to step **8**.

MANU: You can set the clock manually.

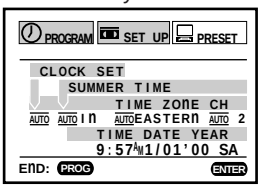
If you select "MANU" mode, select "SUMMER TIME" using ***CURSOR RIGHT***. Set to "IN" or "OUT" for the summer (daylight saving) time using ***CURSOR UP*** or ***CURSOR DOWN***. (For "IN" and "OUT" selections, see the description in step **9**.)

Move to the next using ***CURSOR RIGHT***.
(To move back, press ***CURSOR LEFT***.)

Vary the digits to set the hour.
CURSOR UP: To increase.
CURSOR DOWN: To decrease.

Repeat steps **5** and **6** to set the minutes, month, day, and the year (by the last two digits).
Proceed to step **10** to start the clock.

8 Press ***ENTER*** to start the "AUTO" clock set feature.
After a while, the VCR automatically updates the clock using the data broadcast by the local TV stations.
The following screen will appear on TV depending on the broadcast at your location.



9 Select the options using ***CURSOR RIGHT*** or ***CURSOR LEFT***. Change the data using ***CURSOR UP*** or ***CURSOR DOWN***.

1) Set "SUMMER TIME (Daylight-Saving Time)".
IN, daylight-saving time begins on the first Sunday in April. Because the clock automatically changes from 2:00 AM to 3:00 AM (forward one hour), remember that any part of a scheduled Timer Recording that falls between these two times will not be recorded.
OUT, daylight-saving time ends on the last Sunday in October. The VCR clock automatically changes from 2:00 AM to 1:00 AM (back one hour). Therefore, it can affect your recording length if one is set for this time.
2) Set "Time Zone".
If you select "AUTO" for your time zone, the VCR sets the clock using the first Coordinated Universal Time information it finds. If the time is not correct, select another time zone or use the "MANU" option.
3) Set "CH".
If you don't know the clock data channel, select "AUTO". The VCR will scan automatically to tune the channel carrying the clock data.

If AUTO CLOCK SET is unsuccessful, set the time and date through the "MANU" clock set menu selection.

10 Press ***PROG***.
Now the clock starts.

11 Press ***PROG*** to exit.

Storing Channels on the VCR

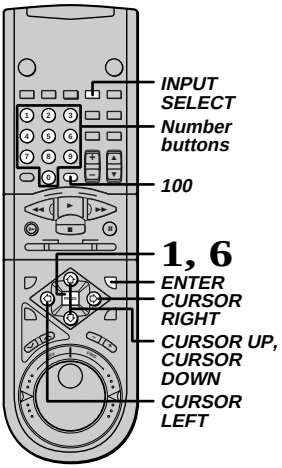
This section is required if you receive only normal TV or unscrambled cable channels, or use a cable box between your TV and the VCR.

Incoming Antenna/Cable (CATV) Signals

The VCR scans through all receivable TV and CATV channels and stores only the active ones in your area into the memory. Once the storing is finished, you can select a desired channel using *CH*.

Preparation

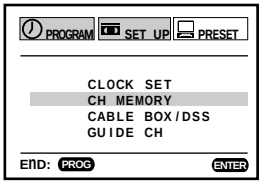
- Turn on the TV, and select the video channel (3 or 4), or the video input mode if you made the Audio/Video connection (page 11).
- Press *INPUT SELECT* so that the channel number will appear if "L1" or "L2" is displayed in the VCR display.



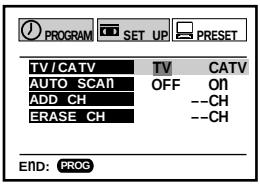
Incoming Antenna/Cable (CATV) Signals

1 Press ***PROG*** to display the MENU screen.

2 Select "PRESET" using ***CURSOR RIGHT*** or ***CURSOR LEFT***, and press ***ENTER***.



3 Select "CH MEMORY" using ***CURSOR UP*** or ***CURSOR DOWN***, and press ***ENTER***.

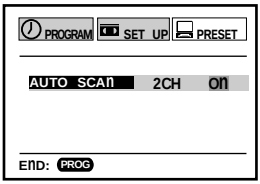


4 Set "TV/CATV" to "TV" or "CATV" using ***CURSOR RIGHT*** or ***CURSOR LEFT***.

TV: To store channels received via the antenna.
CATV: To store channels received via the incoming cable.

5 Select "AUTO SCAN" using ***CURSOR UP*** or ***CURSOR DOWN***, and press ***CURSOR RIGHT*** to set to "ON".

The VCR starts scanning and the channels are stored in the VCR in ascending order. When the scanning is finished, the screen automatically returns.



6 Press ***PROG*** to exit.

Adding or erasing channels

Adding channels

If a desired channel cannot be scanned automatically because of a weak signal, it can be added to the memory.

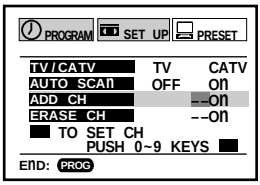
Erasing channels

You can erase a stored channel from the memory if it is unnecessary.

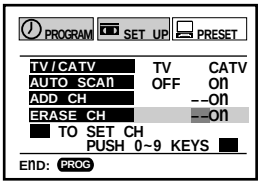
1) Follow steps **1** to **3** of "Incoming Antenna/CATV Signals".

2) Select "ADD CH" or "ERASE CH" using ***CURSOR UP*** or ***CURSOR DOWN***.

To add channels



To erase channels



3) Enter a channel number of 1 to 125 using ***number buttons***.

For more than 100 number, first press ***100***.

For CATV channels, refer to the chart below. (For other orders, check with your cable company.)

4) Repeat steps **2)** and **3)** to add or erase channels as necessary.

5) Press ***PROG*** to exit.

Selecting stored channels

Once the active channels have been stored, you can select the channels in two ways below.

Number buttons

To enter digits of the channel number.

- For one-digit number, enter 0 before.
- For more than 100 number, first press *100*.
- Each *number button* needs to be pressed within 2 seconds.

CH / TRK

To shift up or down the stored channel numbers.

Channel reference chart

Number on the VCR Corresponding channel number																				
TV CATV STD (HRC/IRC)												1 – 1(A-8)	2 2 2	3 3 3	4 4 4	5 5 5(A-7)	6 6 6(A-6)	7 7 7	8 8 8	9 9 9
10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
10	11	12	13	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51
31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51
R	S	T	U	V	W	AA	BB	CC	DD	EE	FF	GG	HH	II	JJ	KK	LL	MM	NN	OO
52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	…
52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	–	–	…
PP	QQ	RR	SS	TT	UU	VV	WW	XX	YY	ZZ	AAA	BBB	65	66	67	68	69	70	71	…
93	94	95	96	97	98	99	100	101	102	103	…	121	122	123	124	125				
–	–	–	–	–	–	–	–	–	–	–	…	–	–	–	–	–				
93	94	A-5	A-4	A-3	A-2	A-1	100	101	102	103	…	121	122	123	124	125				

CATV signals

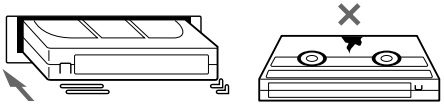
- STD (standard) cable TV signals
- HRC (Harmonic Related Carriers) cable TV signals
- IRC (Incremental Related Carriers) cable TV signals
  IRC is also called ICC (Incremental Coherent Carriers)

Video Cassette Use

Video Cassette Use

Loading a cassette

Push the cassette into the cassette compartment with the window side facing up and the label side towards the front. The VCR is automatically turned on. The [ ] indicator will appear in the VCR display.



Ejecting a cassette

Press ***EJECT***. The cassette is ejected from the cassette compartment.

Warning

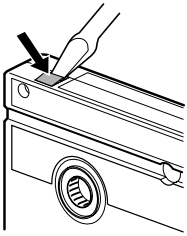
Do not insert your hands or any foreign objects into the compartment. This may result in injury or damage. Take special care with children to avoid accidents.

Precautions when using video cassettes

Video cassettes have a safety tab to prevent accidental erasure. If the tab has already been removed, recording cannot be performed.

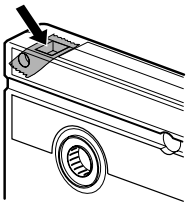
To prevent accidental erasure

Remove this safety tab with a screwdriver.



To record again

Cover the tab hole with adhesive tape.



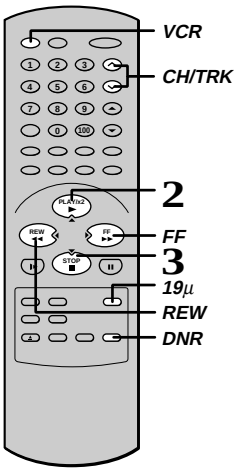
- Avoid exposing cassettes to direct sunlight. Keep them away from heaters.
  Avoid extreme humidity, vibrations or shock, strong magnetic fields (near a motor, transformer or magnet) and dusty place.

Playback

This section explains the basic playback operation.

Preparation

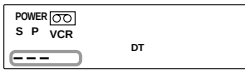
- Select the video channel (3 or 4) or video input mode on the TV.
- **Press *VCR* to set the remote control operating the VCR.**



Basic Playback

1 Load a recorded cassette.
Power is turned on.
If the cassette has no safety tab, playback starts automatically.

2 Press ***PLAY*** to start playback.



3 To stop playback, press ***STOP***.

Rewinding / Fast-forwarding

Press ***REW*** or ***FF*** in the Stop mode.

Adjusting the tracking

When playback starts, the VCR automatically adjusts the tracking for clear pictures and sound (Digital Auto Tracking).

The “DT” indicator blinks during the adjusting.

If the VCR cannot locate the best possible tracking point, hold down one of ***CH/TRK*** to adjust the tracking manually.

- To resume the digital auto tracking, hold down both ***CHANNEL*** on the VCR simultaneously for about 2 seconds.

Notes

- During the adjusting, the playback picture and sound may be distorted.
- The digital auto tracking is activated only in the playback mode.
- To reset the manual tracking point to the center, press both *CHANNEL* on the VCR simultaneously for not longer than 1 second.
- The noise on the screen may not be completely eliminated depending on the tape used, especially when the tape was recorded on another VCR.

19μ HEAD

You can view high quality pictures while playing back a tape recorded in the SLP tape speed.
By pressing ***19μ*** repeatedly, the 19μ HEAD mode is displayed on the TV screen as follows:

19U-HEAD AUTO: Usually set to “AUTO”. As the playback starts, the VCR automatically activates the 19μ head and reproduces high quality pictures.

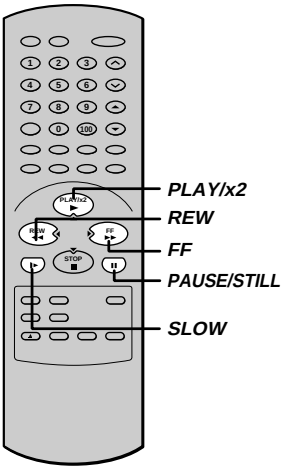
19U-HEAD OFF: Set to “OFF” if the pictures are marred by dots.

Note

During playback with the 19μ head, momentary noises or shakes may be produced when you change the mode to the picture search or variable speed playback.

Variable Speed Playback

You can play back a tape at various tape speeds.



Picture Search

A tape runs at 5 times or 7 times the normal playback speed so that you can quickly locate a particular scene.

1 Press ***FF*** or ***REW*** during playback.
The tape runs at 5 times the normal playback speed.

2 To change the tape speed to 7 times the normal playback speed, press and hold ***FF*** or ***REW***.
If you release it, the tape speed returns to 5 times.

Note
If you press *FF* or *REW* during picture search, the mode changes to fast-forwarding or rewinding.

To resume normal playback

Press ***PLAY***.

Still Picture

A picture freezes so that you can watch closer.

1 Press ***PAUSE/STILL*** during playback.
The picture freezes.

To resume normal playback

Press ***PAUSE/STILL***.

Notes
- The still mode is automatically cancelled after about 5 minutes and returns to normal playback.
- The still picture may shake if a picture of a fast-moving object or scene is frozen. This is not a defect in the unit.

Adjusting Still Picture Stability

If the still picture is distorted or flickers, hold down one of ***CH/TRK*** until the picture becomes stable.

Note
The distortion of the still picture may not be eliminated completely.

Slow-motion Picture

The tape runs at 1/7th or 1/15th the normal playback speed.

1 Press ***SLOW*** during playback.
The tape runs at about 1/7th the normal playback speed.
Each time you press ***SLOW***, the speed alternates between 1/7th and 1/15th.

To resume normal playback

Press ***PLAY***.

Notes
- The slow-motion picture mode is automatically cancelled after about 5 minutes and returns to normal playback.
- The slow-motion picture may flicker up and down. This is not a defect in the unit.

Adjusting the Tracking Manually

If the slow-motion picture is noisy, hold down one of ***CH/TRK*** until the best picture is obtained.

Note
The noise in the slow-motion picture may not be eliminated completely.

Note
When playing back a tape which is recorded in S-VHS format, distortion may occur during the variable speed playback.

Frame Advance

A picture advances frame by frame.

1 Press ***PLAY*** during still playback.
Each time you press ***PLAY***, the picture advances one frame.
If you press and hold ***PLAY***, the tape runs at 1/30th the normal playback speed.

To resume normal playback
Press ***PAUSE/STILL***.

Double Speed Playback

A tape runs at twice the normal speed.

1 Press ***PLAY*** during playback.
The picture runs at twice the normal playback speed.

To resume normal playback
Press ***PLAY***.

Jog Dial Operation

You can control the speed of frame advance.

1 During playback, press ***PAUSE/STILL***.

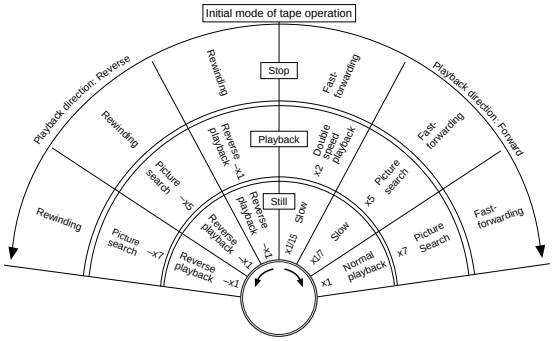
2 Turn the ***jog dial*** on the Remote Control.
The speed of frame advance varies as you turn the jog dial.
When you stop turning the dial, the picture freezes.

To cancel the jog dial mode
Press ***PAUSE/STILL***.

Shuttle Dial Operation

You can also activate the picture search and slow playback at various speeds by turning the shuttle dial on the VCR or Remote Control.

1 Turn the ***shuttle dial*** on the VCR or Remote Control.



The playback speeds differ depending on the recording tape speed of the tape as follows.

	Picture search		Reverse playback
SP:	x5	x7	-x1
SLP:	x15	x21	-x3

Notes
- The still picture mode will be released automatically after about 5 minutes and forward playback will start.
- Fast-forwarding or rewinding started from the stop mode continues even if the *shuttle dial* is released. To stop, press *STOP*.
- The reverse playback mode will be released automatically after about 25 seconds and forward playback will start.
- Noise bar may appear in reverse playback.

Note
If you playback a tape recorded in the SLP tape speed or a tape recorded on another VCR in various speed mode, the picture may be noisy or monochrome.

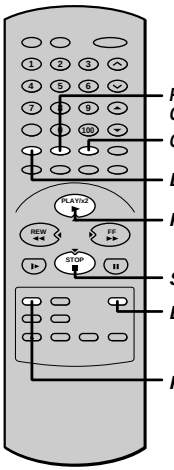
Useful Functions in Tape Operation

These functions will help your playback.

S-VHS Quasi Playback (SQPB)

- This VCR can also play back a tape which is recorded in S-VHS format. But the playback picture does not have the same quality and resolution as the original S-VHS playback picture.
- This VCR cannot record in S-VHS format.

* SQPB is an abbreviation for S-VHS Quasi Playback.



Counter Function

You can view the clock, linear time counter or tape remaining time in the VCR display or on the TV screen.

1 Each time you press ***REMAIN/COUNTER***, the VCR display changes in sequence as follows:

→ Linear time counter (HMS) → Tape remaining time (REMAIN/RT) → Clock

The indication above will also appear on the TV screen by pressing ***DISPLAY***. They are switchable with ***REMAIN/COUNTER***.

To reset the linear time counter to "0H00M00S"

The counter is automatically reset to "0H00M00S" when a cassette is ejected. If you want to reset at another point, such as the beginning of a new recording, just press ***COUNT RESET***.

Notes

- The linear time counter does not work on non-recorded portions on the tape.
- When the tape is ejected or the VCR is turned off, the display changes to clock.
- If the tape rewinds back over "0H00M00S", "–" appears in the VCR display.
- The displayed time of the linear time counter is only an approximation.

Tape Remaining Time

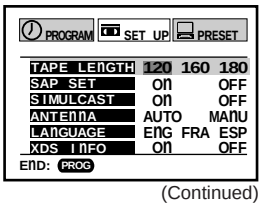
To view the tape remaining time in the VCR display, select the tape length beforehand.

1 Turn on the VCR and load a cassette.

2 Press ***PROG*** to display the MENU screen.

3 Select "SET UP" using ***CURSOR RIGHT*** or ***CURSOR LEFT***, and press ***ENTER***.

4 Select the length of the tape.
T120: for a T-120 tape or shorter
T160: for a T-140 or T-160 tape
T180: for a T-180 tape

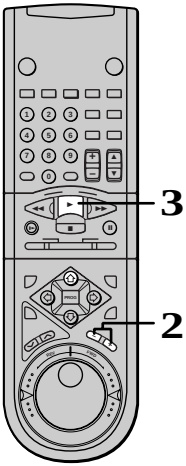


(Continued)

5 Press ***PROG*** to exit.

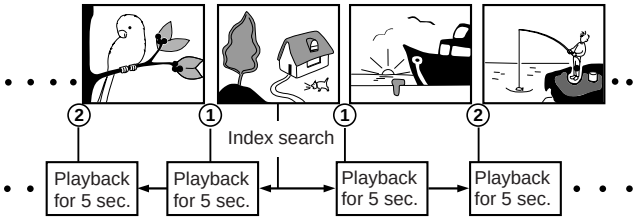
6 Press ***REMAIN/COUNTER***.
The remaining time ("RT - : - -") appears in the VCR display.

Notes
- The displayed remaining time is an approximation.
- The remaining time is calculated according to the tape speed (SP or SLP) and the cassette type.



Index Search Function

The VCR can find a point where a registered index signal is on a tape and play back for about 5 seconds. You can easily locate the desired program by inputting the index signal.



Registering index signals

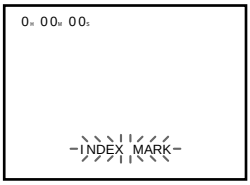
Each time a recording starts, an index signal is automatically registered. To register it somewhere else, press ***INDEX (+)*** during recording.

Note
A certain interval is required between the index signals: more than 1 minute in the SP tape speed and more than 3 minutes in the SLP tape speed.

Index search

1 Load a cassette with the index signals registered.

2 Press ***INDEX (–)*** or ***(+)*** in the stop or playback mode.
–: To search in the reverse direction.
+: To search in the forward direction.
The VCR fast-forwards or rewinds the tape. When an index signal is found, the VCR plays back the tape for about 5 seconds, and then resumes fast-forwarding or rewinding. This is repeated each time at an index signal.



3 Press ***PLAY*** when the desired program is found.
Normal playback starts.

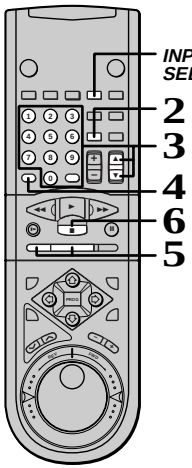
Notes
- At the very beginning of the tape, the index search may not work properly.
- If you registered the index signals on a tape recorded on another VCR, the recording may be blurred at the index point and the index search may not work properly.

Recording a TV Program

This section explains the basic recording operation.

Preparation

- Select the video channel (3 or 4) or video input mode on the TV.
- If you record cable channels via the cable box, finish the cable box set-up (pages 33 - 36) and turn on the cable box.

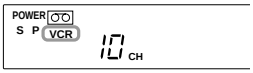


To record from other connected equipment
In step **3**, press ***INPUT SELECT*** to switch the display as follows:
LI: To record via the LINE IN 1 jacks on the rear panel.
L2: To record via the LINE IN 2 jacks on the front panel.

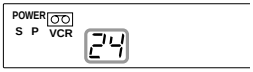
Basic Recording

1 Load a cassette with the safety tab attached.

2 Press ***TV/VCR*** so that the "VCR" indicator appears in the VCR display.



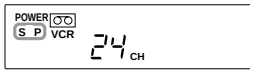
3 Select a channel to record with ***CHANNEL*** on the VCR, or ***CH/TRK*** or ***number buttons*** on the remote control.



If you see "L1" or "L2" in the VCR display, press ***INPUT SELECT*** so that the channel number appears.

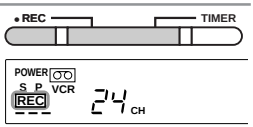
- If you record cable channels via the cable box, make the output channel number of the cable box or "L1" appear, depending on your connection. (See pages 11 – 13.)

4 Press ***SP/SLP*** to select the recording tape speed.



SP: Suitable for general recording with better picture and sound quality.
SLP: Suitable for tripling recording time, but with less picture and sound quality than using the SP tape speed.

5 Press ***REC*** on the VCR, or simultaneously press both ***REC*** on the remote control.
Recording starts.



6 Press ***STOP*** to stop recording.

Watching a TV program while recording another

1) While recording, press ***TV/VCR*** to turn off "VCR" indicator.
2) Choose another channel using the channel selector on the TV.

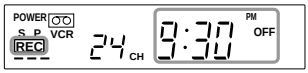
Skipping unnecessary scenes while recording

Press ***PAUSE/STILL*** to stop recording momentarily. To resume recording, press ***PAUSE/STILL*** again.

Note
The VCR automatically shifts to the stop mode if the recording pause mode continues for 10 minutes.

Recording off time setting

By setting the recording off time, the recording stops and the VCR is turned off automatically.
While recording, press ***REC*** on the VCR repeatedly to set the desired off time.
Each time you press *REC*, each half-hour up to about 4 hours later and "- : - -" appear cyclically.



Notes

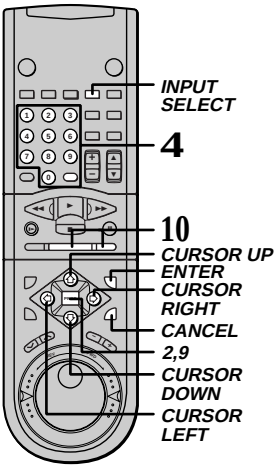
- To cancel the recording in progress, press *STOP*.
- If the VCR clock is not set, this function will not activate.

Timer Program Recording

The programmable timer allows you to record up to 6 different programs over one month.

Preparation

- Select the video channel (3 or 4) or video input mode on the TV.
- Make sure that the clock is set correctly (page 16).
- Store the channels on the VCR (pages 17 and 18).
- If you record cable channels, finish the cable box set-up (pages 33 - 36), and turn on the cable box.
- If you record satellite channels, finish the DSS® satellite receiver set-up (pages 37 - 39), and turn on the DSS® satellite receiver.



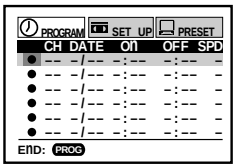
Timer Programming Procedure

Example: To record cable channel 25 in the SP tape speed from 9:30 p.m. until 10:00 p.m. on August 30. Today is August 25.

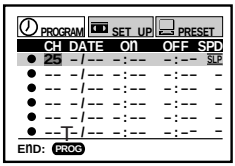
1 Load a cassette with the safety tab attached.

2 Press ***PROG*** to display the MENU screen.

3 Select "PROGRAM" using ***CURSOR RIGHT*** or ***CURSOR LEFT***, and press ***ENTER***.



4 Move to the next using ***CURSOR RIGHT***, and enter the channel number 25 by using ***CURSOR UP***, ***CURSOR DOWN*** or ***number buttons***.



- To Record a cable program from the connected cable box:
  Enter the cable channel number by ***number button***, ***PLAY*** or ***STOP***.
  If your cable box is not remote-controllable, choose the desired channel (1 to 125) on the cable box.
- To record a satellite program from connected DSS® satellite receiver:
  Enter the satellite channel number (100 to 999) by ***number button***, ***PLAY*** or ***STOP***. (If a number 1 to 99 is entered, the VCR will record a TV/CATV program on the channel, not a satellite's.)
  If your DSS® satellite receiver is not remote-controllable, choose the desired channel (100 to 999) on the DSS® satellite receiver.

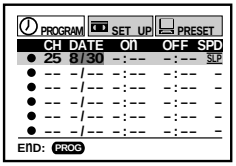
To make corrections:

Press ***CURSOR LEFT*** to move back to the item, or ***CURSOR RIGHT*** to forward.

5 Move to the next using ***CURSOR RIGHT***, and set the recording date using ***CURSOR UP*** or ***CURSOR DOWN***.

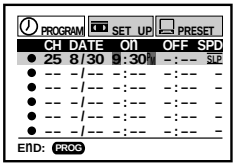
The date changes as follows:

→ 8/25 → 8/26 → ··· → 9/24 → WKLYSU → ···
MO~FR ← WKLYSA ←

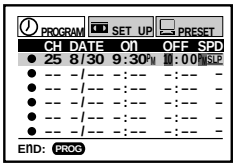


[WKLYSU]···[WKLYSA]: You can record TV programs on the same channel on the day and time every week.
[MO~FR]: You can record TV programs on the same channel on the day and time Monday through Friday.

6 Move to the next using ***CURSOR RIGHT***, and set the hour and minutes of the recording start time.



7 Move to the next, and set the recording off time.

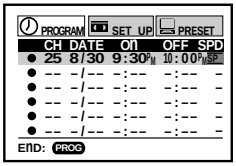


8 Move to the next, and select the tape speed (SP) using ***CURSOR UP*** or ***CURSOR DOWN***.

For the tape speed “AUTO (Auto Speed Select)”, see below.

To set another program, press ***CURSOR RIGHT***, and select the next line pressing ***CURSOR DOWN***.

Repeat steps **4** to **8**.

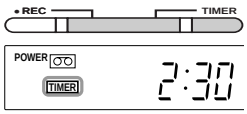


9 Press ***PROG***.

Now programming is completed.

10 Press both ***TIMER*** simultaneously.

The power turns off and the VCR enters the timer standby mode.



Auto Speed Select

If you are not sure the tape is long enough for timer program recording in the SP tape speed, set the recording tape speed to “AUTO”.

Recording starts in the SP tape speed and the VCR automatically selects the tape speed to record the program to the end. If the tape length is not long enough, the tape speed automatically changes from SP to SLP.

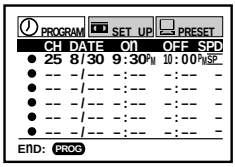
Notes

- Make sure that the tape length is selected correctly according to the tape used on the SET UP screen (page 23).
- When the SLP tape speed is selected and the tape length is not sufficient to record the program to the end, the program cannot be recorded to the end.
- The picture will be distorted when playing the part where the recording tape speed is switched from SP to SLP with the Auto Speed Select feature.

Confirming the timer programs (in the timer standby mode)

Press ***PROG***.

The screen for confirming will appear.



After about 30 seconds, the screen disappears.

Changing/cancelling the timer programs

1) If the TIMER indicator is lit, press both ***TIMER*** to turn it off, and then turn the VCR on by pressing ***VCR POWER***.

2) With steps **2** to **9**, change the items.

To cancel a program, select the program you want to cancel in step **4**, and press ***CANCEL***. The line is then cleared.

3) Press both ***TIMER*** to return to the timer standby mode.

Recording or playback in the timer standby mode

First press both ***TIMER*** to release the timer standby mode, and then press ***VCR POWER*** to turn on the VCR. The VCR will be available for use.

- Be sure to press both ***TIMER*** again to return the VCR to the timer standby mode after you are finished.

Error indication

The "E" (Error) indicator appears in the VCR display if you press both *TIMER* when:

— a cassette is not loaded.

— the loaded cassette has no safety tab.

— no timer program is set.

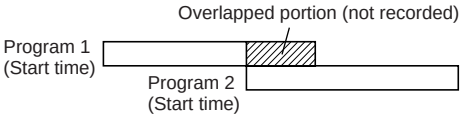
In these cases, a recording can not be made.

If a power failure occurs during the timer program recording (including VCR Plus+ C³® system recording (page 31))

- When a power failure has occurred, "- -:- -" appears in the VCR display. Since the programmed contents have been cleared, reset the clock and timer programming.
- When power has failed for a short time, the colon of the current time display blinks. The programmed contents are not affected. Reset the clock.

Overlaps of the programs

If two timer programs overlap, the recording start time of program 2 has priority over the recording off time of program 1.



VCR Plus+ C³® system *Set-up*

VCR Plus+ C³® system is a timer recording system for an easier programming that requires you only to enter a PlusCode® programming number assigned to a desired program. This section explains the necessary set-up to make VCR Plus+ C³® system recordings.

The flow chart below will give you an idea as to what must be done to use the VCR Plus+ C³® system feature.

Setting the Clock (page 16)
↓
Cable Box Set-up (page 33)
↓
Storing Channels on the VCR (page 17)
↓
VCR Plus+ C³® system Set-up
↓
VCR Plus+ C³® system Recording (page 31)

* With the VCR Plus+ C³® system, this video cassette recorder can automatically select the appropriate channel on your compatible cable box or satellite receiver. VCR Plus+, C³ and PlusCode are registered trademarks of Gemstar Development Corporation. The VCR Plus+ system is manufactured under license from Gemstar Development Corporation.

You must give the VCR the special numbers for guide channels (also called VCR Plus+® system channel numbers) assigned to each channel that you receive in your home. The VCR identifies the channel to be recorded by the guide channel number you enter.

The guide channel numbers are published in TV guide magazine, selected local TV publications, or the channel guide from cable company. If you cannot find the numbers, call Gemstar's customer service department at 1-800-4321-VCR.

Sample of a Guide channel chart from a local TV listing

VCR Plus+® SYSTEM CHANNEL NUMBERS

Broadcast channels		Assigned channels	Cable channels	Assigned channels
3	KCRA (NBC)	3	A & E	39
6	KVIE (PBS)	6	AMC	35
10	KXTV (CBS)	10	BET	57
13	KOVR (ABC)	13	BRAV	54
19	KCSO (SPAN)	19	CMTV	14
31	KRBK (IND)	31	CNBC	23
40	KTXL (FOX)	40	CNN	42
58	KSCH (IND)	25	C-SPAN	28
44	KBHK (IND)	15	CUNY	29
24	KCPM (NBC)	24	DIS	53
4	KRNV (NBC)	28	ESPN	34
42	KFCB (IND)	27	FAM	47
7	KGO (ABC)	28	HBO	33

Sample of a Channel line-up chart from a cable-TV company

CHANNEL LINE-UP CHART

Channel 2	ME/U
Channel 3	8 WISH
Channel 4	4 WTTV
Channel 5	6 WRTV
Channel 6	VCA/Local origination
Channel 7	HOME BOX OFFICE
Channel 8	A.P News Plus
Channel 9	9 WGN.

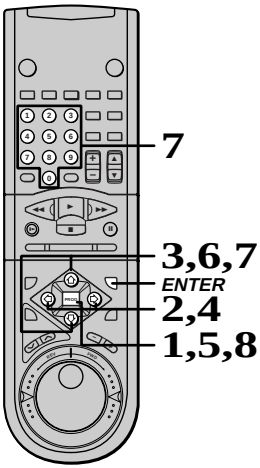
VCR Plus+ C³® System Set-up (Continued)

Preparation

- Select the video channel (3 or 4) or video input mode on the TV.
- If you record cable channels, finish the cable box set-up (pages 33 - 36).
- Prepare the list like below.

Example

Station	Guide channel number (on the TV Guide, local TV listings etc.)	Your home channel number (on the channel line-up chart supplied by cable companies)
HBO	33	7
ESPN	34	
AMC	35	



Guide Channel Setting

1 Press ***PROG***.

2 Select "PRESET" using ***CURSOR RIGHT*** or ***CURSOR LEFT***, and press ***ENTER***.

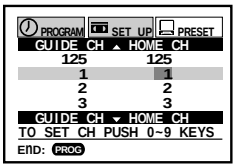
3 Select "CH MEMORY" using ***CURSOR UP*** or ***CURSOR DOWN***, and press ***ENTER***.

4 Set "TV/CATV" to "TV" or "CATV" using ***CURSOR RIGHT*** or ***CURSOR LEFT***.

5 Press ***PROG*** to return to the PRESET screen.

6 Select "GUIDE CH" using ***CURSOR UP*** or ***CURSOR DOWN***, and press ***ENTER***.

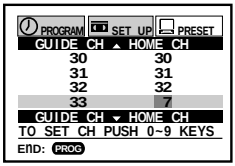
(the case of CATV mode)



7 Enter channel numbers on the right of the guide channel numbers.

Find a guide number you marked on the list using ***CURSOR UP*** or ***CURSOR DOWN***, and enter the corresponding home channel number if necessary by using ***number buttons***.

Example: To enter home channel number 7 (HBO) with guide channel number 33 assigned.



In some areas, one channel may be assigned more than one guide channel number. In this case, enter the home channel number to each of the guide channel numbers.

8 Press ***PROG*** to exit.

The set-up is all over and your VCR Plus+C³® system recording is now available.

Notes

- When your cable company changes the channel line-up, you must re-do this set-up for the channel.
- The VCR Plus+ C³® system feature does not work on programs from a connected DSS® satellite receiver.

VCR Plus+ C³® system *Recording*

After performing the z system set-up, you can easily program a recording simply by entering the PlusCode® programming number. The numbers are published in the TV listings of newspapers, TV guide magazine, etc.

Preparation

- Make sure that the clock is set correctly (page 16).
- Load a cassette with a safety tab.

For cable box users:

- Finish the cable box set-up (pages 33 – 36), and turn on the cable box.

For DSS® satellite receiver users:

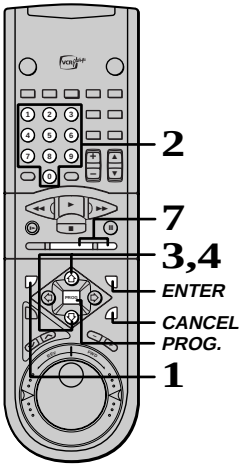
- This VCR cannot record satellite programs with the VCR Plus+ C³® system feature. To make an unattended recording of satellite programs, see “Timer Program Recording” (pages 26 – 28).

Sample of TV program listing in a TV guide magazine

5PM (FAM) **POPEYE** — **Cartoon** 725692
(HBO) **MAKING OF A CHAMPION** 237945
A look at gymnast and Olympic hopeful Kim Zmeskal from novice to seasoned competitor.
(NIK) **HEY DUDE** — **Children** (793571)
One of Ted’s teachers stays at the ranch.
(USA) **MY TWO DADS** — **Comedy** (586858)
5:35 (TBS) **GOOD TIMES** — **Comedy** 2261858

PlusCode® programming number

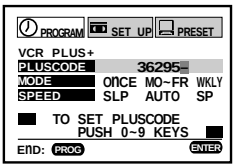
VCR Plus+ C³® system Programming



1 Press ***VCR Plus+***.
The VCR Plus+ screen appears.

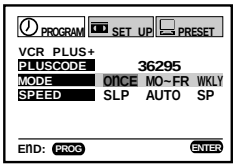
2 Enter a PlusCode® programming number.

Example: To record a program with the PlusCode® programming number 36295 (fictitious code).
Press ***number button 3, 6, 2, 9 and 5***.
Confirm that the number is entered correctly.
To correct a mistake, press ***CANCEL*** and enter the correct number.

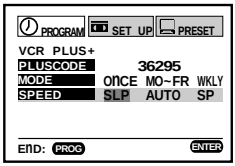


3 Select “MODE” using ***CURSOR UP*** or ***CURSOR DOWN***, and set the recording frequency.

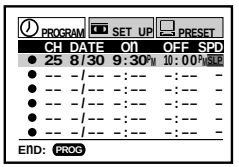
ONCE: To record once.
DAILY(MO~FR): To record programs on the same channel at the same time Monday through Friday.
WEEKLY: To record programs on the same channel at the same time on the same day every week.



4 Select “SPEED” using ***CURSOR UP*** or ***CURSOR DOWN***, and set the recording tape speed.
For AUTO speed, see page 27.

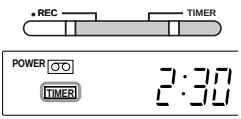


5 Press ***ENTER***.
The program setting is now memorized.
- If your cable box is not remote-controllable, select the recording channel on the cable box beforehand.



6 To set another program, repeat steps **1** to **5**.

7 To finish press the two ***TIMER*** buttons simultaneously.
The VCR enters the timer standby mode.



Confirming the VCR Plus+ C³® system timer programs

Before the VCR enters the timer standby mode (TIMER indicator not lit)

1) Press ***PROG*** to display the MENU screen.
2) Press ***ENTER*** to select "PROGRAM".
Check the programmed data.
3) Press ***PROG*** to exit.

During the timer standby mode (TIMER indicator lit)

Press ***PROG.***
The screen for confirming appears.
After about 30 seconds, the screen disappears.

Canceling the VCR Plus+ C³® system timer programs

1) If the TIMER indicator is lit, press both ***TIMER*** to turn it off, and turn on the VCR by pressing ***VCR POWER***.
2) Press ***PROG*** to display the MENU screen.
3) Press ***ENTER*** to select "PROGRAM".
4) Select a program which you want to cancel.
5) Press ***CANCEL***.
The line is cleared out.
6) Press ***PROG*** to exit.

Recording or playback in the timer standby mode

First press both ***TIMER*** to release the timer standby mode, and then press ***VCR POWER*** to turn on the VCR. The VCR will be available for use.
- Be sure to press both ***TIMER*** again to return the VCR to the timer standby mode after you have finished.

Error indications

If "FULL / CANCEL PROG?" message appears on the TV during programming, no more programs can be entered. If you want to add another, delete one existing program on the screen by using ***CURSOR UP*** or ***CURSOR DOWN***.

If an incorrect PlusCode® programming number is entered, "ERROR CODE ENTERED" appears on the screen. Press ***CANCEL*** to clear the number and enter correct one.

If "CLASH" message appears on the TV during programming, it tells you that two programs with the same recording start time have been entered. Correct either of the two programs as follows:

1) Select the number of the program to correct by using ***CURSOR UP*** or ***CURSOR DOWN***.
2) Correct the data, or clear out the line by pressing ***CANCEL*** and then press ***VCR Plus+*** to enter a PlusCode® programming number.

Cable Box Set-up

The VCR can directly control channel selecting of the connected cable box.

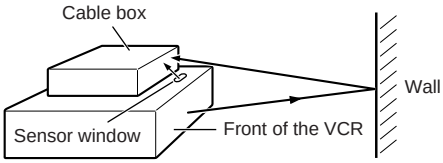
Cable Box Control

This VCR needs to be connected to a cable box equipped with an infrared wireless remote control. You can select cable channels from the cable box by operating this VCR.

It is also possible to automatically change the cable channels according to your program setting in the timer program recording or VCR Plus+ C³® system recording.

Placing the Cable Box

Put the cable box on the top of the VCR as shown below. Do not block the sensor window.



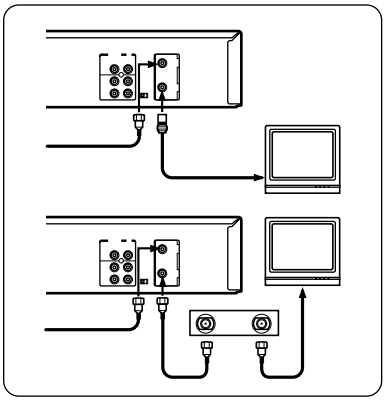
The infrared signals come out of the sensor window and the front of the VCR. Then they bounce off walls and other objects in the room and are received by the cable box. The VCR sends out infrared signals to your cable box even during timer program recording or VCR Plus+ C³® system recording.

Notes

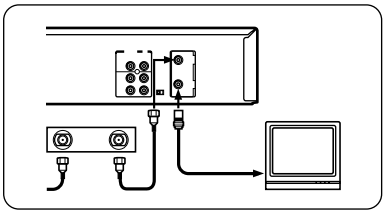
- If the channels cannot be controlled properly because the infrared signal fails to reach the cable box, change the position of the box on the VCR so that it can receive the signal.
- Keep the cable box turned on even while the VCR is in the timer program recording or VCR Plus+ C³® system recording.

Connection Type

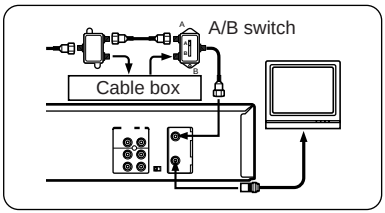
Type A



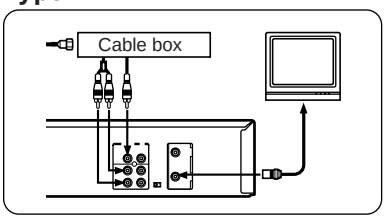
Type B



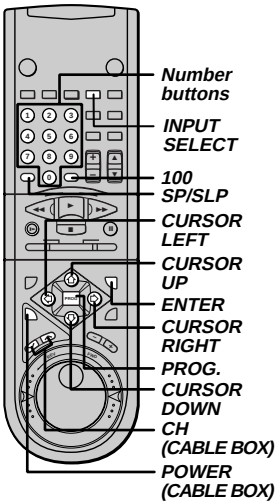
Type C



Type D



Preparation
- Select the video channel (3 or 4) or video input mode on the TV.
- Set "TV/CATV" on the CH MEMORY screen to "CATV" (page 17).



Cable Box Set-up

1 Press ***PROG.*** to display the MENU screen.

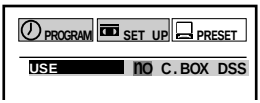
2 Select "PRESET" using ***CURSOR RIGHT or CURSOR LEFT***, and press ***ENTER***.

3 Select "CABLE BOX/DSS" using ***CURSOR UP*** or ***CURSOR DOWN***, and press ***ENTER***.

4 Select "NO" or "C.BOX" using ***CURSOR RIGHT*** or ***CURSOR LEFT*** according to your connection type.

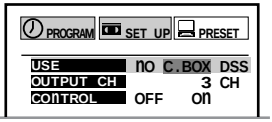
NO: • **Type A**
• **Type C (A/B switch "A")**
- Cable channels will be selected using *CH/TRK* on the remote control or *CHANNEL* on the VCR.

→ Go to step **8**.



C.BOX: • **Type B**
• **Type C (A/B switch "B")**
• **Type D**

→ Go to step **5**.

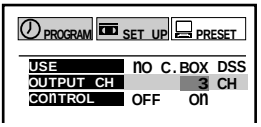


5 Select "OUTPUT CH" using ***CURSOR UP*** or ***CURSOR DOWN***, and enter either of the following according to your connection.

(Example)

Type B, C: the output channel number of your cable box using ***number buttons***. (Usually 3 or 4. Check the rear of the cable box.)

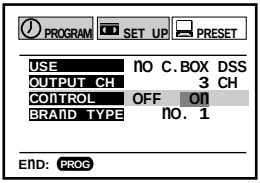
Type D: the line input mode "L1" using ***INPUT SELECT***.



6 Select "CONTROL" using ***CURSOR UP*** or ***CURSOR DOWN***, and set to "ON" or "OFF" using ***CURSOR RIGHT*** or ***CURSOR LEFT***.

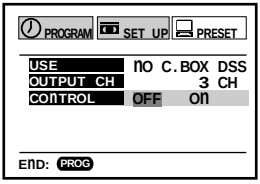
ON: if your cable box is remote-controllable.
- Cable channels will be selected by *CH (CABLE BOX)* on the remote control. The VCR can change the cable channel to the desired one when timer recording or VCR Plus+ C^{3}® system recording starts.

→ Go to step **7**.



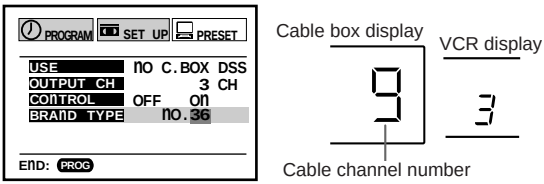
OFF: if your cable box is NON remote-controllable.
- Cable channels will be selected by the own channel selector of the cable box. The VCR channel should be set to the output channel of the cable box.

→ Go to step **8**.



7 Select “BRAND TYPE” using ***CURSOR DOWN***, and enter a brand code of your cable box using ***number buttons***. Refer to the table on the next page.

Example: For a TOSHIBA cable box, identified by number 36.



Make sure that the channel display of your cable box has changed to 9. If not, try each brand code assigned to the brand of your cable box until the display changes to 9.
If it still holds;

- Relocate the cable box on the VCR.
- Use each of digits from 1 to 91.

8 Press ***PROG.*** to exit.

Notes

- If your cable channel does not change to 9 in step **7**, the cable box will not be able to change channels in the timer recording. In this case, set “CONTROL” to “OFF” in step **6**.
- The cable box control is not compatible with the DSS® satellite receiver control.

Buttons to control a remote-controllable cable box

Once you complete the set-up for a remote controllable cable box, your cable box can be controlled by the following buttons on the remote control of the VCR.

- ***POWER (CABLE BOX)***
  To turn the cable box on or off.
- ***CH (CABLE BOX)***
  To select cable channels in the upper or lower direction. (not applicable to some brands of cable box.)
- ***Number buttons (0 – 9)***
  To select desired channels to record.
- ***100***
  Some cable boxes require you to use this button as the enter button. Press this button after selecting the cable channel with number buttons.

Cable Box Set-up (continued)

Table of cable box brand codes

Brand name of your cable box	Brand code
Toshiba	36
Anvision	13, 20, 21, 22, 23, 24, 25, 26, 58, 62, 84
Archer	1, 20, 21, 29, 42, 44, 63, 88, 91
Cablestar	13, 20, 21, 22, 23, 24, 25, 26, 58, 62, 84
Cableview	30, 42, 44, 52, 63, 88
Citizen	30, 42, 44, 52, 63, 88
Curtis	8, 9, 56, 61
Diamond	1, 20, 21, 29, 42, 44, 63, 88, 91
Eagle	13, 20, 21, 22, 23, 24, 25, 26, 58, 62, 84
Eastern	26, 28
GC Brand	30, 42, 44, 52, 63, 88
Gemini	4, 30, 85
General Instrument	1, 2, 3, 4, 31, 34, 55, 85, 91
Hamlin	14, 15, 28, 41
Hitachi	31, 79, 80
Jerrold	1, 2, 3, 4, 31, 34, 55, 85, 91
Macom	31, 79, 80
Magnavox	13, 20, 21, 22, 23, 24, 25, 26, 58, 62, 84
Movietime	29, 32, 38, 39, 42, 44, 88
NSC	29, 32, 38, 39, 42, 44, 88
OAK	10, 11, 12, 13, 46
OAK Sigma	10, 11, 12, 13, 46
Panasonic	6, 8, 16, 17
Philips	4, 13, 20, 21, 22, 23, 24, 25, 26, 58, 62, 84
Pioneer	5, 6, 78
Pulsar	30, 42, 44, 52, 63, 88
Randtek	13, 20, 21, 22, 23, 24, 25, 26, 58, 62, 84
RCA	6, 8, 16, 17
Realistic	44, 88
Regal	14, 23, 41, 84
Regency	26, 28
Rembrandt	29, 32, 38, 39, 42, 44, 88
Samsung	4, 6, 32, 42, 78
Scientific Atlanta	8, 9, 56, 61
Sheritech	27
SL Mark	4, 6, 32, 42, 78
Sprucher	6, 8, 16, 17
Stargate	4, 6, 30, 32, 42, 44, 52, 63, 78, 88
Sylvania	19
Teknika	74
Telecaption	77
Teleview	4, 6, 32, 42, 78
Texscan	18, 19
Tocom	1, 33, 34, 42, 48, 49, 73, 91
Unika	1, 20, 21, 29, 42, 44, 63, 88, 91
Universal	29, 42, 43, 44, 52, 63, 82, 88
Videoway	7, 23, 45, 50, 84
Viewstar	13, 20, 21, 22, 23, 24, 25, 26, 58, 62, 84
Warner Amex	6
Zenith	7, 23, 45, 50, 84

DSS® Satellite Receiver Set-up

The VCR can directly control channel selecting of the connected DSS® satellite receiver.

DSS® Satellite Receiver Control

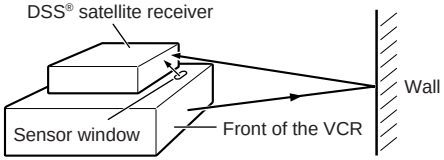
This VCR needs to be connected to a DSS® satellite receiver equipped with an infrared wireless remote control. You can select satellite channels from the DSS® satellite receiver by operating this VCR.

DSS® is registered trademark of DIRECTV, Inc., a unit of GM Hughes Electronics.

It is also possible to automatically change the satellite channels according to your program setting in the timer program recording.

Placing the DSS® Satellite Receiver

Put the DSS® satellite receiver on the top of the VCR as shown below. Do not block the sensor window.



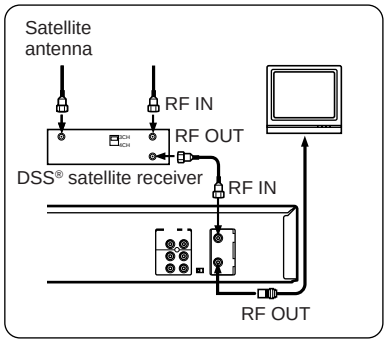
The infrared signals come out of the sensor window and the front of the VCR. Then they bounce off walls and other objects in the room and are received by the DSS® satellite receiver. The VCR sends out infrared signals to your DSS® satellite receiver even during timer program recording.

Notes

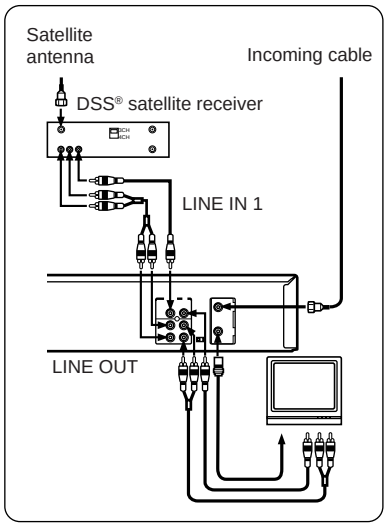
- If the channels cannot be controlled properly because the infrared signal fails to reach the DSS® satellite receiver, change the position of the receiver on the VCR so that it can receive the signal.
- Keep the DSS® satellite receiver turned on even while the VCR is in the timer program recording.

Connection Type

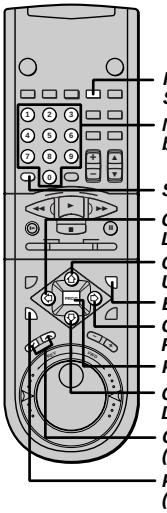
Type A



Type B



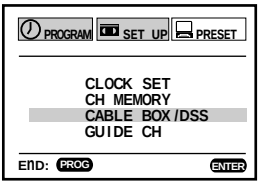
Preparation
Select the video channel (3 or 4) or video input mode on the TV.



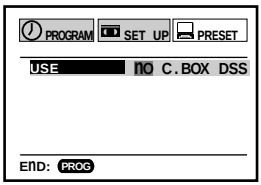
DSS® Satellite Receiver Set-up

1 Press ***PROG.*** to display the MENU screen.

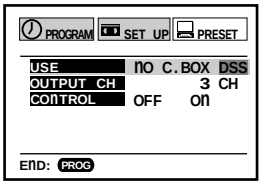
2 Select “PRESET” using ***CURSOR RIGHT*** or ***CURSOR LEFT***, and press ***ENTER***.



3 Select “CABLE BOX/DSS” using ***CURSOR UP*** or ***CURSOR DOWN***, and press ***ENTER***.

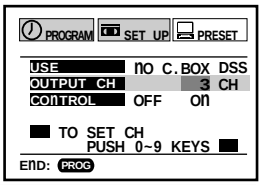


4 Select “DSS” using ***CURSOR RIGHT***.



5 Select “OUTPUT CH” using ***CURSOR UP*** or ***CURSOR DOWN***, and enter either of the following according to your connection.

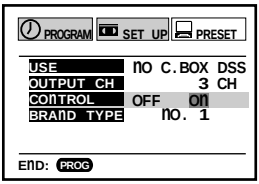
(Example)



Type A: the output channel number of your DSS® satellite receiver using ***number buttons***. (Usually 3 or 4. Check the rear of the DSS® satellite receiver.)

Type B: the line input mode “L1” using ***INPUT SELECT***.

6 Select “CONTROL” using ***CURSOR UP*** or ***CURSOR DOWN***, and set to “ON” or “OFF” using ***CURSOR RIGHT*** or ***CURSOR LEFT***.



ON: if your DSS® satellite receiver is remote-controllable.

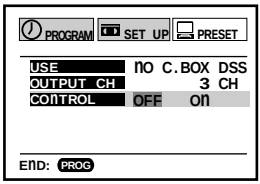
- Satellite channels will be selected by *CH (CABLE BOX)* on the remote control.
  The VCR can change the satellite channel to the desired one when timer recording starts.

→ Go to step 7.

OFF: if your DSS® satellite receiver is NON remote-controllable.

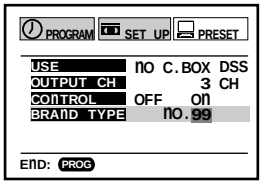
- Satellite channels will be selected by the own channel selector of the DSS® satellite receiver.
  The VCR channel should be set to the output channel of the DSS® satellite receiver.

→ Go to step 8.

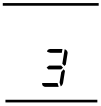


7 Select "BRAND TYPE" using ***CURSOR DOWN***, and enter a brand code of your DSS® satellite receiver using ***number buttons***. Refer to the table on the next page.

Example: For a TOSHIBA DSS® satellite receiver, identified by number 99.



VCR display



Make sure that the background of the above display has changed to the satellite program on channel 200. If not, relocate the DSS® satellite receiver on the VCR so that it can receive the infrared signal.

8 Press ***PROG.*** to exit.

Notes

- If your satellite channel does not change to 200 in step **7**, the DSS® satetllite receiver will not be able to change channels in the timer recording. In this case, set "CONTROL" to "OFF" in step **6**.
- The VCR Plus+ C³® system recording is not available on satellite channels.
- The DSS® satellite receiver control is not compatible with the cable box control.

Buttons to control a remote-controllable DSS® satellite receiver

Once you complete the set-up for a remote controllable DSS® satellite receiver, your DSS® satellite receiver can be controlled by the following buttons on the remote control of the VCR.

- ***POWER (CABLE BOX)***
  To turn the DSS® satellite receiver on or off.
- ***CH (CABLE BOX)***
  To select satellite channels in the upper or lower direction. (not applicable to some brands of DSS® satellite receiver.)
- ***Number buttons (0 – 9)***
  To select desired channels to record.

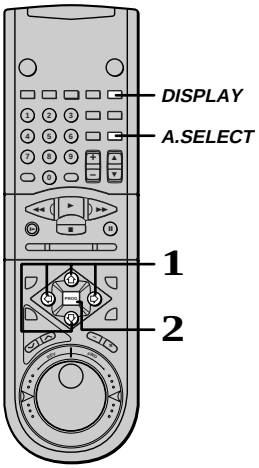
Table of DSS® satellite receiver brand codes

Brand name of your DSS® satellite receiver	Brand code
TOSHIBA	99
RCA	98
SONY	97

MTS Broadcast Compatibility

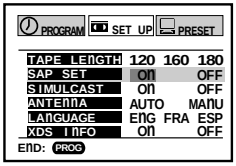
This VCR can receive or record MTS (Multichannel TV Sound) broadcasts. By connecting the VCR to your stereo system or stereo TV, you will experience the SAP or stereo sound.

Preparation
Connect a stereo TV or stereo system to the AUDIO OUT jacks of the VCR.



Recording the SAP/Stereo Broadcast

1 On the SET UP screen (page 15), select “SAP SET” using ***CURSOR UP*** or ***CURSOR DOWN***, and set to “ON” using ***CURSOR LEFT*** or ***CURSOR RIGHT***.



2 Press ***PROG*** to exit.

3 Perform a recording.

SAP (Second Audio Program broadcast):
A separate audio program, usually broadcast in a second language with the main language.

Selecting a sound

Sounds recorded on the tape

According to your setting of “SAP SET” on the SET UP screen, the sound is recorded onto different tracks of the tape as below. Set “SAP SET” to “ON” or “OFF” appropriately.

Type of receiving broadcast	Setting of “SAP SET” on the SET UP screen	On-Screen Display (Press ***DISPLAY***.)		Contents of recorded sound		
				Normal sound track (Mono)	Hi-Fi sound track	
		“SAP”	“STEREO”		L	R
Regular (monaural audio)	“ON” or “OFF”	not lit	not lit	MONO	MONO	MONO
Stereo	“ON” or “OFF”	not lit	lit	MONO (MIXED)	STEREO	
Regular+SAP	“ON”	lit	not lit	MONO	MONO	SAP
	“OFF”	lit	not lit	MONO	MONO	MONO
Stereo+SAP	“ON”	lit	lit	MONO	MONO	SAP
	“OFF”	lit	lit	MONO (MIXED)	STEREO	

Sounds in playback

You can play SAP and/or stereo broadcasts with this VCR. Press ***A.SELECT*** to select a desired sound.

Desired sound	L , R indicators in the VCR display	Sound output
SAP sound	R (right) is on.	SAP
Stereo sound	Both R (right) and L (left) are on.	Stereo

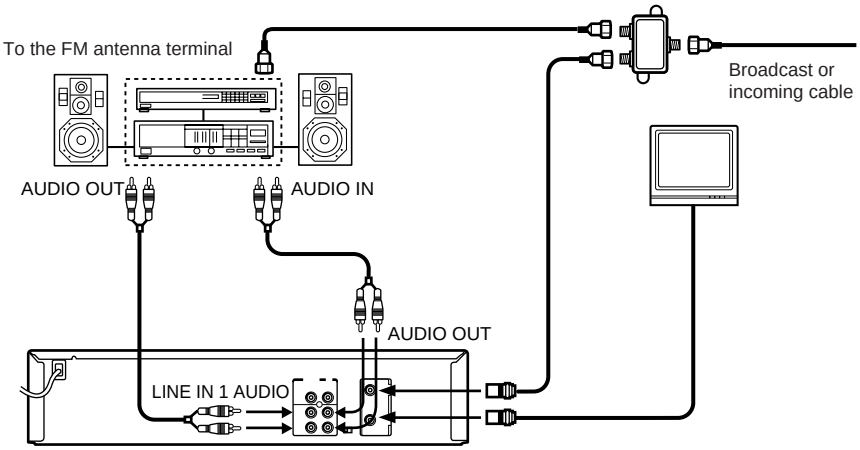
Note
When the TV is connected to the RF OUT terminal of the VCR, the output sound is monaural.

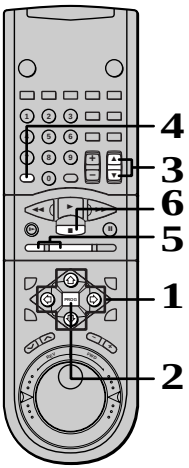
Simulcast Recording

When TV program such as MTV, HBO or MAX is being simulcast in FM stereo in your area, the VCR can also record the simulcast sound from an FM stereo tuner or receiver onto the Hi-Fi track and normal track.

Preparation

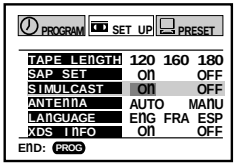
- Connect the TV and stereo system to the VCR as below.
- Turn on the connected FM tuner and tune to the station for the simulcast program.





Simulcast Recording

1 On the SET UP screen (page 15), select “SIMULCAST” using ***CURSOR UP*** or ***CURSOR DOWN***, and set to “ON” using ***CURSOR LEFT*** or ***CURSOR RIGHT***.



2 Press ***PROG*** to exit.

3 Select the desired channel using ***CHANNEL*** on the VCR or ***CH/TRK*** on the remote control.
If you use a cable box, select a desired channel on the box.

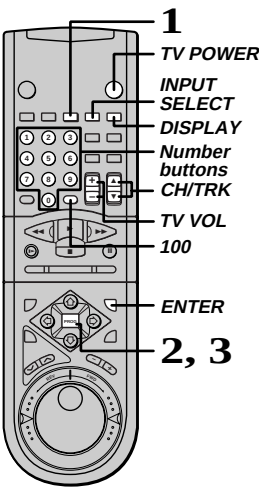
4 Select the recording tape speed using ***SP/SLP***.

5 Press ***REC*** to start recording.

6 Press ***STOP*** to stop recording.

Multi Brand Remote Control

The remote control can be compatible with various brands of TV by setting their control codes. The TOSHIBA code has initially been set to control TOSHIBA TVs.



Setting Control Codes

1 Press ***TV*** to set the remote control operating your TV.

2 While holding down ***PROG***, enter the two digits of your TV's brand code (listed right) using ***number buttons***.

Hold down. PROG

Example 0 → 2

3 Release ***PROG***.

4 Point the remote control at your TV and use each button listed below to make sure that your TV is operated correctly.

TV POWER	To turn the TV on or off.
CH/TRK	To select TV channels in the upper or lower direction.
TV VOL	To adjust the sound level.
INPUT SELECT	To select an external source such as a VCR.
Number buttons	To select TV channels. When selecting channels 1 to 9, first enter 0 and then the desired number.
100	To substitute for 100 channel key.
DISPLAY	To turn on or off TV's screen display.
ENTER	To use for the TV's ENTER key.

Important

Some TVs may not respond to all the operations above, or may not be operated at all with this remote control. In this case, operate your TV with its own remote control.

Notes

- For some brands, several control codes (brand codes) are allocated. Try each of them until the buttons work on your TV.
- If you replace the remote control's batteries, set the brand code again.

Table of Brand Codes

Brand name of your TV	Brand Code
Toshiba	01
Bell & Howell	09
Carver	10
Celebrity	03
Citizen	12
Curtis Mathes	09, 12
Dumont	14
Electro band	03
Emerson	09, 11
Fisher	09
GE	02, 07, 11
Gibralter	14
Goldstar	11
Hallmark	11
Hitachi	06
Infinity	10
JBL	10
JCB	03
JVC	05
LXI	01, 02, 09, 10, 11
Magnavox	10
Marantz	10
Megatron	06, 11
Memorex	04, 09, 11
MGA	04, 11
Midland	02, 07, 14
Mitsubishi	04, 11
Motorola	08
MTC	12
NAD	01, 11
Nikko	11
Optimus	09
Optonica	08
Panasonic	07, 10, 15
Penney	01, 02, 07, 11, 12
Philco	10
Philips	10
Pioneer	16
Princeclub	12
Prism	07
Proscan	02

Brand name of your TV	Brand Code
Proton	11
Pulser	14
Quasar	07, 15
Radio Shack	13
RCA	02
Realistic	09, 11, 13
Runco (NEC)	14
Samsung	11, 12
Sanyo	09
Scotch	11
Scott	11
Sears	01, 02, 09, 10, 11
Sharp	08, 13
Sony	03
Soundesign	11
Supreme	03
Sylvania	10
Tandy	08
Technics	07, 15
Techwood	07
Teknika	04, 10, 12
TMK	11
Victor	05
Vidikron	10
Vidtech	11
Wards	10, 11, 13
Zenith	14

Before Calling Service Personnel

Check the following symptoms before requesting servicing.

No power.

- The power cord is not plugged in.
  - **Plug the power cord into the outlet firmly.**

Although the power is on, the VCR will not work.

- There is no cassette.
  - **Load a cassette. (page 19)**

The clock does not work.

- There has been a power failure.
  - **Reset the clock. (page 16)**

The timer does not work properly.

- The time is incorrect.
  - **Set the clock correctly. (page 16)**

The picture does not appear on the TV screen.

- The video channel or video input mode is not set correctly.
  - **Set the TV channel to the video channel (3 or 4) or set the video input mode on the TV. (page 11)**
- The TV signal is weak.
  - **Adjust the antenna direction or use an optional antenna booster.**
- The power cord is not plugged in.
  - **Plug the power cord into the outlet firmly.**

The picture does not appear on the TV screen during recording and playback.

- The video channel or VCR mode is not set correctly.
  - **Press *TV/VCR* to select the VCR mode and set the TV channel to 3 or 4. (pages 11, 25)**

The VCR does not record.

- The loaded cassette has no safety tab.
  - **Use a cassette with a safety tab or cover the hole with adhesive tape. (page 19)**

The playback picture is poor.

- Tracking is not set appropriately.
  - **Adjust the tracking manually. (page 20)**
- The video heads are dirty.
  - **Clean the video heads with a commercially available cleaning tape.**

The desired sound is not heard, such as SAP, stereo, or regular sound.

- Setting of sounds is not correct.
  - **Select a desired sound using *A.SELECT*. (page 40)**

Noise is present in the Hi-Fi sound being played.

- Tracking is not set appropriately.
  - **Adjust the tracking manually. (page 20)**

The timer recording function does not work.

- There is an error in programming.
  - **Reset the timer recording program. (page 26)**
- There is no cassette in the VCR.
  - **Load a cassette with the safety tab attached. (page 19)**
- The cassette does not have the safety tab.
  - **Use another cassette with a safety tab or cover the hole with adhesive tape. (page 19)**
- The timer indicator is not displayed.
  - **Press both *TIMER* simultaneously. (page 27)**
- There has been a power failure.
  - **Reset the clock. (page 16)**
- The cable box set-up has not been set correctly.
  - **Make the set-up correctly. (page 34)**
- The cable box is not turned on.
  - **Turn on the cable box.**

The VCR Plus+ C³ ® system recording cannot be done.

- The guide channel numbers are not set up correctly.
  - **Make the guide channel number setting. (page 29)**
- The cable box is not turned on when the channel comes in the VCR via the cable box.
  - **Turn on the cable box.**
- The cable box set-up has not been set correctly.
  - **Make the set-up correctly. (page 34)**
- The timer indicator is not displayed.
  - **Press both *TIMER* simultaneously. (page 32)**

The remote control does not work properly.

- The batteries are exhausted.
  – **Replace all batteries. (page 10)**
- The remote control is operated beyond the operating range.
  – **Make sure the remote control is within 30° of the remote sensor on the VCR. (page 10)**
- Too far from the VCR.
  – **Use the remote control within 7 m from the front of the VCR. (page 10)**
- An obstacle may be in the way of the operation.
  – **Remove the obstacle.**
- The operating mode of the remote control is not set correctly.
  – **Press *VCR* or *TV* depending on the equipment you want to operate. (pages 14, 42)**

The cassette is ejected immediately after it is loaded.

- The cassette was inserted with the label side not paralleling the compartment.
  – **Reload it carefully. (page 19)**

The cassette does not go into the cassette compartment.

- There is already a cassette in the VCR.
  – **Eject the cassette and reload the new one. (page 19)**

Specifications

Power supply:	120 V AC, 60 Hz
Power consumption:	19 W
External dimensions:	430 × 96.5 × 281 mm (W.H.D.)
Mass:	3.8 kg
Channels received:	VHF: Channels 2–13 UHF: Channels 14–69 CATV: Channels 1–125
Antenna input/output terminals:	UHF/VHF: 75 Ω F type connector
Signal system:	Standard NTSC
Recording/Playback system:	Recording: VHS format (SP, SLP) Playback: VHS format (SP, LP, SLP)
Cassette:	Video cassette with VHS mark
Tape speed:	SLP: 11.1 mm/s, SP: 33.4 mm/s
Video recording/playback time:	SLP: 480 minutes, SP: 160 minutes (When T-160 video cassette is used.)
Fast forward time:	Within approx. 80 s (When T-120 video cassette is used.)
High speed rewind time:	Within approx. 54 s (when T-120 video cassette is used.)
Video input:	1 V (p-p), 75 Ω, unbalanced, negative sync., pin jack
Video output:	1 V (p-p), 75 Ω, unbalanced, negative sync., pin jack
Audio input:	Line input: 308 mV (rms), more than 47 kΩ, pin jack
Audio output:	Line output: 308 mV (rms), less than 4.7 kΩ, pin jack
Audio frequency range (Hi-Fi):	20 Hz – 20 kHz
Audio dynamic range (Hi-Fi):	90 dB
Utilization conditions:	Temperature: 5°C to 40°C Humidity: less than RH 80%

Accessories

Antenna cable 1
Remote control 1
Batteries (AAA) 2

Designs and specifications are subject to change without notice.

LIMITED WARRANTY TOSHIBA VIDEO CASSETTE RECORDER

Toshiba America Consumer Products, Inc. ("TACP") and Toshiba Hawaii Inc. ("THI") make the following limited warranties. These limited warranties extend to the original consumer purchaser or any person receiving this set as a gift from the original consumer purchaser and to no other purchaser or transferee.

Limited Ninety (90) Day Warranty
TACP/THI warrant this product against defects in materials or workmanship for a period of ninety days after the date of original retail purchase. During this period, TACP/THI will repair a defective product or part, without charge to you. You must deliver the entire product to a TACP/THI Authorized Service Station. You are responsible for all transportation and insurance charges for the set to and from the Authorized Service Station.

Limited One (1) Year Warranty
TACP/THI further warrant the parts in this product against defects in materials or workmanship for a period of one (1) year after the date of original retail purchase. During this period, TACP/THI will replace a defective part without charge to you, except that if a defective part is replaced after ninety (90) days from the date of the original retail purchase, you pay labor charges involved in the replacement. You must also deliver the entire product to a TACP/THI Authorized Service Station. You are responsible for all transportation and insurance charges for the set to and from the Authorized Service Station.

Rental Units
The warranty for rental units begin with the first rental or thirty (30) days from the date of shipment to the rental firm, whichever comes first.

Commercial Units
Products sold and used for commercial use have a limited ninety (90) day warranty for all parts and labor.

Owner's Manual and Demographic Card
You should read the owner's manual thoroughly before operating this product. You should complete and mail the enclosed Demographic card within ten (10) days after you, or the person who has given you this product as a gift, purchased this product. This is one way to enable TACP/THI to provide you with better customer service and improved products. Failure to return the card will not affect your rights under this warranty.

Your Responsibility
The above warranties are subject to the following conditions:

(1) You must retain your bill of sale or provide other proof of purchase.
(2) You must notify an Authorized TACP/THI Service Station within thirty (30) days after you discover a defective product or part.
(3) All warranty servicing of this product must be made by an Authorized TACP/THI Service Station.
(4) These warranties are effective only if the product is purchased and operated in the U.S.A or Puerto Rico.
(5) Labor service charges for set installation. Set up, adjustment of customer controls and installation of repair or antenna systems are not covered by this warranty. Reception problems caused by inadequate antenna systems are your responsibility.
(6) Warranties extend only to defects in materials or workmanship as limited above and do not extend to any product or parts which have been lost or discarded by you or to damage to products or parts caused by misuse, accident, damage caused by Acts of God, such as lightning or fluctuations in electric power, improper installation, improper maintenance or use in violation of instructions furnished by us; or to units which have been altered or modified without authorization of TACP/THI or to damage to products or parts there of which have had the serial number removed, altered, defaced or rendered illegible.
(7) At you option, after the warranty period has expired in the U.S.A. Call (800)-631-3811 to receive information concerning an exchange price. Payment must be enclosed with the product in the form of a certified check or money order and forward your product to:
Toshiba America Consumer Products Inc.
Returns Center
1420C Toshiba Dr.
Lebanon, TN 37087
(8) Upon receipt we will, at our option, replace your unit with a new or refurbished unit of equal value. Features may not be identical to your original product.
(9) Physically damaged units are not acceptable for repair or exchange in or out of warranty and will be returned as received.

LIMITED WARRANTY (continued)

How to Obtain Warranty Service

(1)Refer to the troubleshooting guide in your owner's manual. This check list may solve your problem.
(2)Call the TACP toll free number **800-631-3811** within (30) days after you find a defective product or part.
(3)Arrange for the delivery of the product to the Authorized TACP/THI Service Station. Products shipped to the Service Station must be insured and safely and securely packed, preferably in the original shipping carton, and a letter explaining the defect and also a copy of the bill of sale or other proof of purchase must be enclosed.

In the Continental United States contact:

In Hawaii contact
Toshiba Hawaii
327 Kamakee Street,
Honolulu, HA 96814
(808)-591-8377

All warranties implied by state law, including the implied warranties of merchantability and fitness for a particular purpose, are expressly limited to the duration of the limited warranties set forth above. With the exception of any warranties implied by state law as hereby limited, the foregoing warranty is exclusive and in lieu of all other warranties, guarantees, agreements and similar obligations of manufacturer or seller with respect to the repair or replacement of any parts. In no event shall TACP/THI be liable for consequential or incidental damages.

No person, agent, distributor, dealer or company is authorized to change, modify or extend the terms of these warranties in any manner whatsoever. The time within action must be commenced to enforce any obligation of TACP/THI arising under the warranty or under any statute, or law of the United States or any state thereof, is hereby limited to ninety (90) days from the date you discover or should have discovered the defect. This limitation does not apply to implied warranties arising under state law. This warranty gives you specific legal rights and you may also have other rights which may vary from state to state. Some states do not allow limitation on how long an implied warranty lasts, when an action may be brought or the exclusion or limitation of incidental or consequential damages, so the above provisions may not apply to you.

ATTENTION CANADIAN CONSUMERS:
Canadian consumers are requested to complete the special Canadian “Warranty Registration Form” enclosed and forward this completed form with a copy of bill of sale to TOSHIBA OF CANADA to “Register and Validate” their warranty. Product must be purchased from an Authorized Canadian Dealer.

Products purchased in the U.S.A and used in Canada are not covered by these warranties.

IMPORTANT: PACKING AND SHIPPING INSTRUCTION
When you send the product to a Service Station, you should use the original carton box and packing material, then insert the original carton box containing the unite into another carton, using more packing material.

TOSHIBA AMERICA CONSUMER PRODUCTS, INC.

Printed in China

SECTION 2
ADJUSTMENT PROCEDURES

1. MECHANICAL ADJUSTMENT
1-1. Mechanical Parts Location
1-2. Servicing Jig List
1-3. Main Parts Servicing Time
1-4. Mechanism Check Method
1-5. Mechanical Deck Removing and Mounting Method
1-6. Main Parts Replacement
1-7. Check and Adjustment
1-8. Self-Check Function
2. ELECTRICAL ADJUSTMENT
2-1. PIF Circuit
2-2. Servo Circuit

1. MECHANICAL ADJUSTMENT

1-1. Mechanical Parts Location

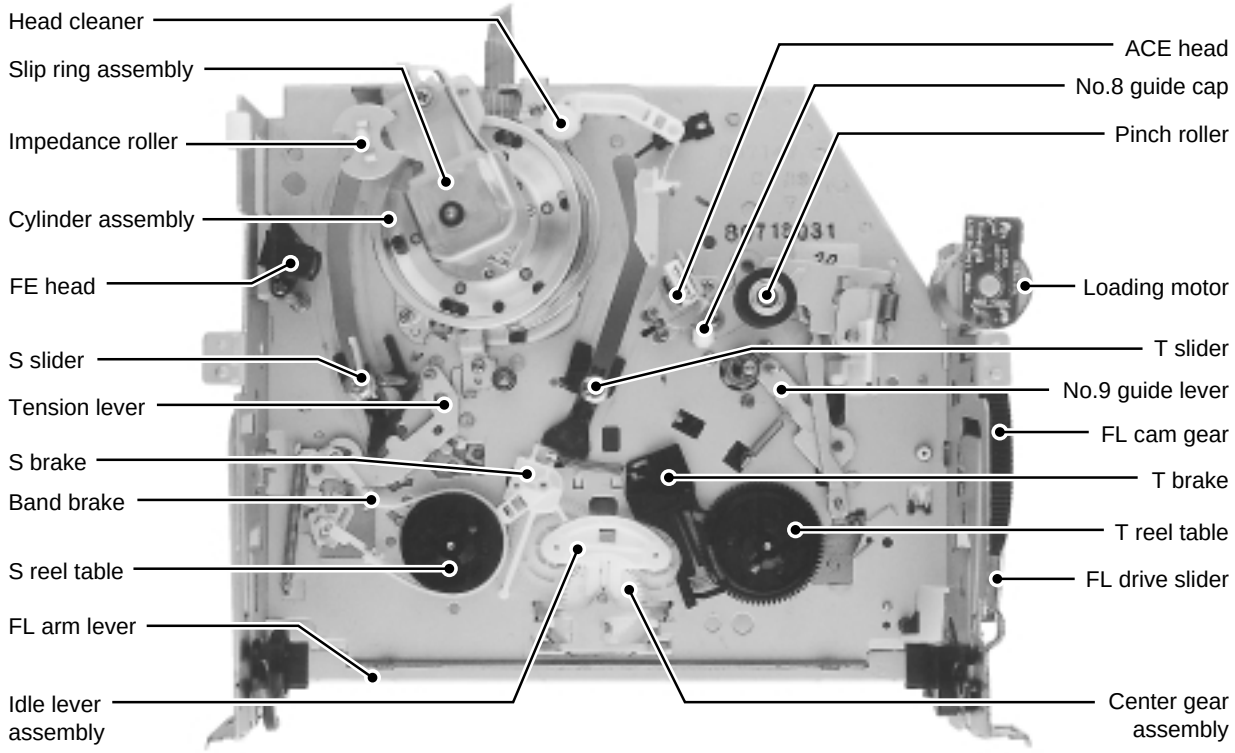


Fig. 1-1-1 Top view-1

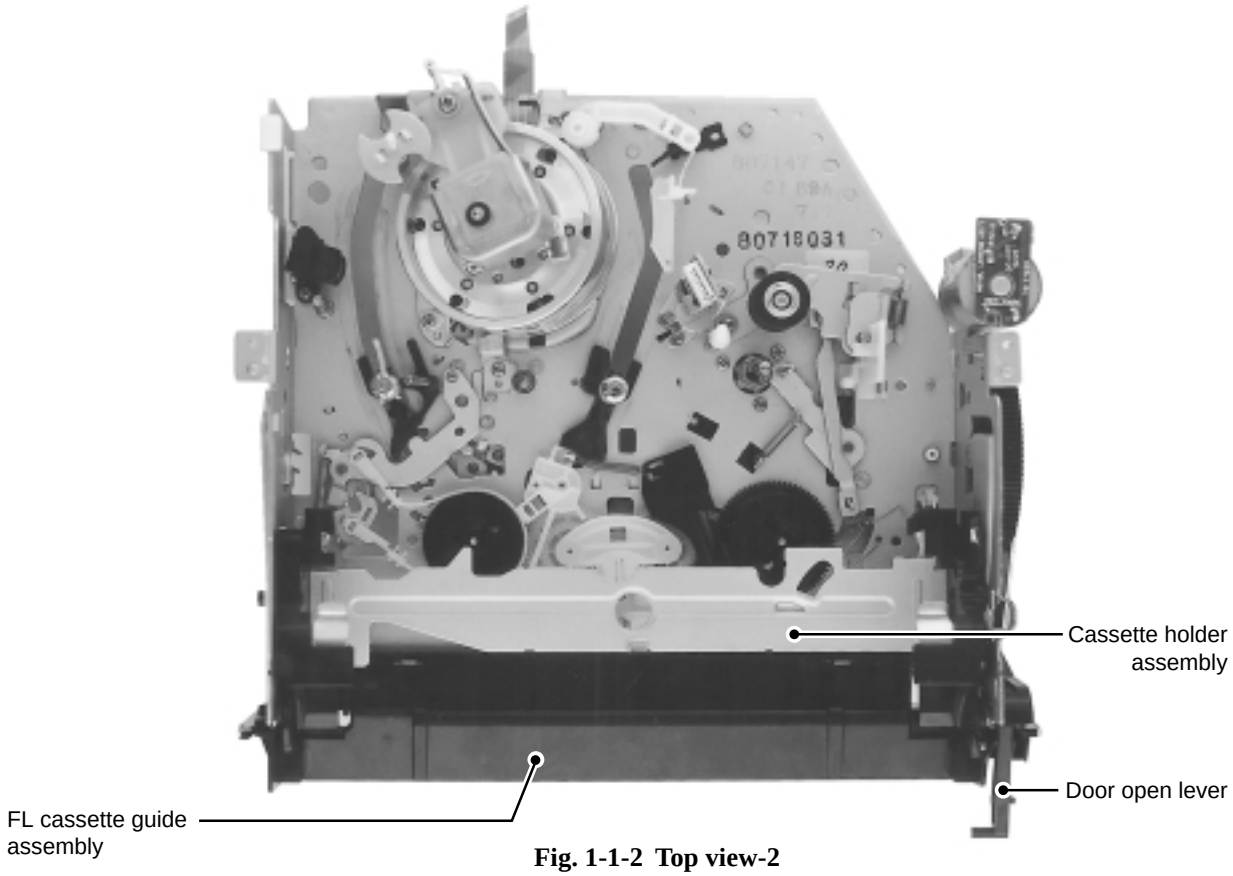


Fig. 1-1-2 Top view-2

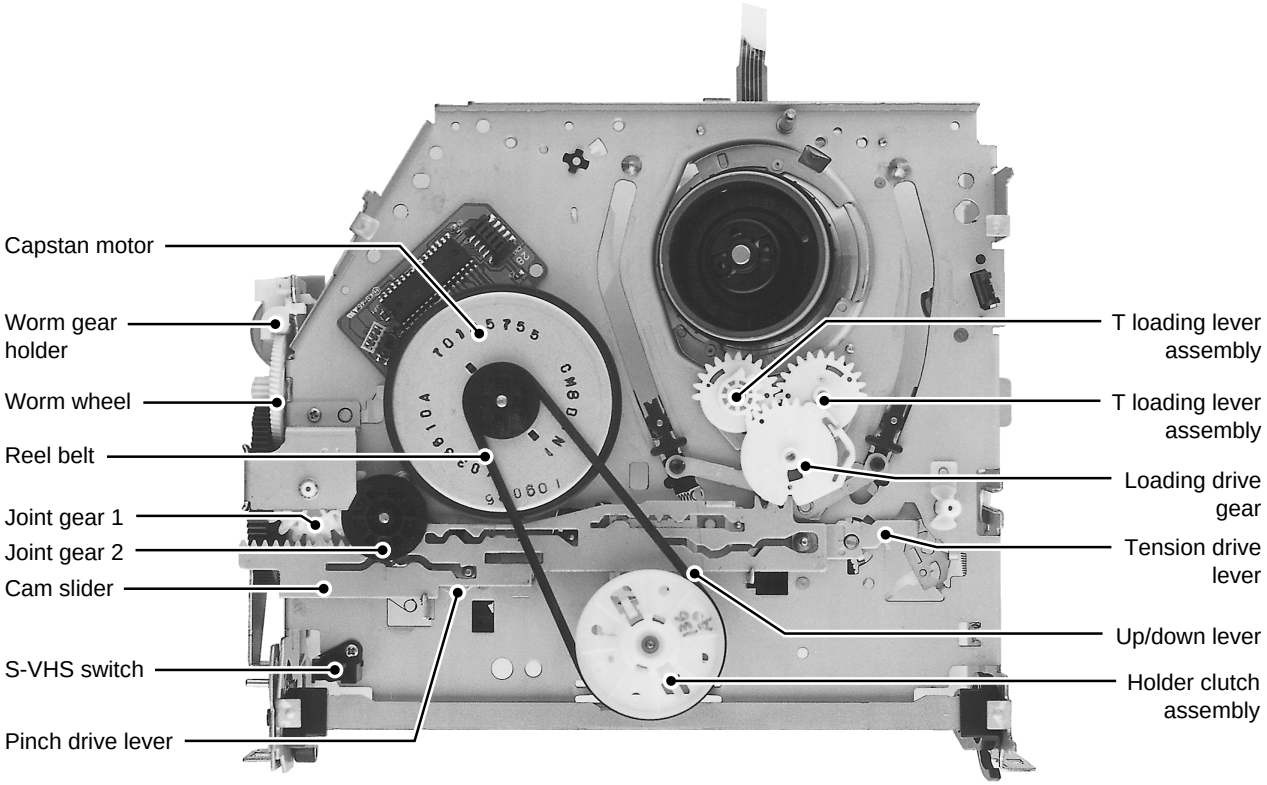
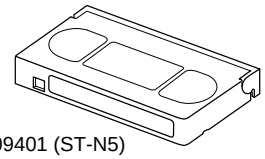
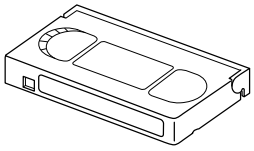
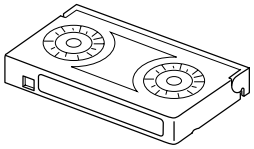
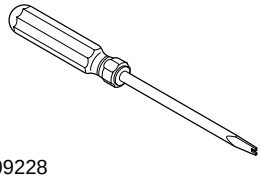
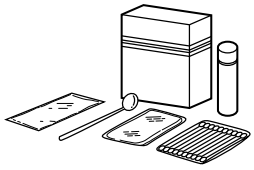


Fig. 1-1-3 Bottom view

1-2. Servicing Jig List

Table 1-2-1

① Alignment tape  70909401 (ST-N5) 70909203 (ST-NF)	② Back tension cassette gauge  70909103	③ Torque cassette gauge (KT-300NR)  70909199
④ Taper nut driver  70909228	⑤ VCR cleaning kit 	⑥ VCR lubrication kit
⑦ Grease		

Note:

- Conventional alignment tapes MH-1 (70909110), MH-1L (70909111) and ST-N1 (70909202) may be used partly also instead of alignment tape ST-N5.

1-3. Main Parts Servicing Time

1. Part replacement time differs from servicing life time of each part.
2. Following table is prepared based on a standard condition (room temperature, room humidity). The replacement time will be varied depending upon operation environment, using methods, operation duty.
3. Particularly, life of the head assembly (cylinder) depends upon operation conditions.

Table 1-3-1

	Part name	Criteria (Operating hours)										Note
		500	1000	1500	2000	2500	3000	3500	4000	4500	5000	
Tape transport system	Tension post	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	• When cleaning, use a swab or piece of gauze soaked in alcohol. • After cleaning, load a video cassette with the cleaned parts dried completely. • When lubricating, always use the specified oil. • When lubricating, apply one or two drops of oil after cleaning with alcohol.
	S/T slant guide post											
	Impedance Roller *											
	No. 8 guide post											
	Capstan											
	No. 9 guide post											
	No. 3 guide post											
	S/T guide roller	Δ	Δ	Δ	○	○	○	○	○	○	○	
	Head assembly (cylinder)	Δ	○	○	○	○	○	○	○	○	○	
	FE head	Δ	Δ	Δ	○	○	○	○	○	○	○	
	ACE head	Δ	○	○	○	○	○	○	○	○	○	
	Pinch roller	Δ	○	○	○	○	○	○	○	○	○	
Tape drive system	Capstan motor	Δ	Δ	Δ	Δ	Δ	○	○	○	○	○	
	Loading motor				○	○	○	○	○	○	○	
	Reel belt	Δ	○	○	○	○	○	○	○	○	○	
	Clutch gear assembly		○	○	○	○	○	○	○	○	○	
	Idle lever assembly		○	○	○	○	○	○	○	○	○	
Others	Band brake		○	○	○	○	○	○	○	○	○	
	Slip ring assembly		○	○	○	○	○	○	○	○	○	

Δ : Cleaning, ○ : Check and replace if necessary.
* : Impedance roller is provided depending on models.

1-4. Mechanism Check Method

If the abnormal condition is caused by the mechanism itself, analyze the cause according to the following procedures.

1-4-1. External Appearance Check

1. Check whether there are foreign matters or not inside the VCR.
2. Check whether the cylinder and the guides for tape transport system are contaminated.

1-4-2. Motor and Sensor System Check

Check whether some abnormalities are found in the motor or the sensor system (including control circuits) according to the flowchart.

1-4-3. Abnormality Analysis by Self-check Function

The unit has a self-check function. The self-check function works as a system which stored some abnormal condition. So, use this function to try to analyze the cause(s).
For the data display method and the content of the data, refer to self-check function in item 1-8.
After repairing, initialize the data by pressing the button while displaying the abnormal mode.

Notes:

- Abnormal data is displayed only when the first abnormal condition occurs, and is not displayed in the second time and after. Accordingly, the claim from customers and the actual data displayed may be different.
- The data is stored only when the power turns off after occurring the abnormality condition(s). The data is not stored when the unit operation is recovered by the microprocessor.

The typical examples in abnormal condition are shown below.

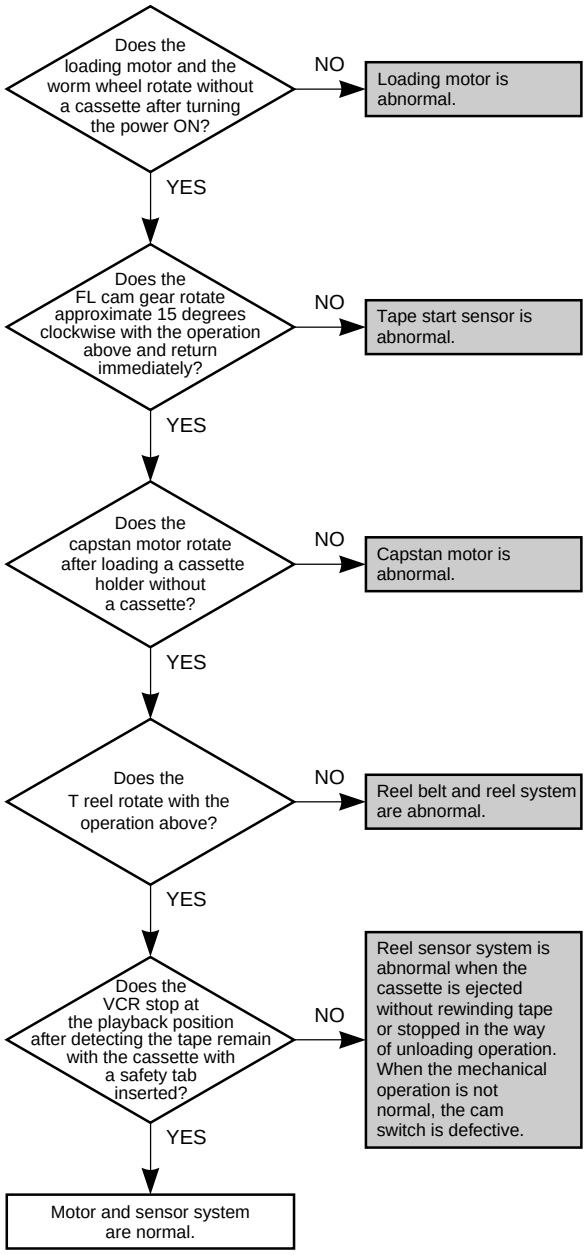

Does the loading motor and the worm wheel rotate without a cassette after turning the power ON?
NO
Loading motor is abnormal.
YES
Does the FL cam gear rotate approximate 15 degrees clockwise with the operation above and return immediately?
NO
Tape start sensor is abnormal.
YES
Does the capstan motor rotate after loading a cassette holder without a cassette?
NO
Capstan motor is abnormal.
YES
Does the T reel rotate with the operation above?
NO
Reel belt and reel system are abnormal.
YES
Does the VCR stop at the playback position after detecting the tape remain with the cassette with a safety tab inserted?
NO
Reel sensor system is abnormal when the cassette is ejected without rewinding tape or stopped in the way of unloading operation. When the mechanical operation is not normal, the cam switch is defective.
YES
Motor and sensor system are normal.

Fig. 1-4-1

Table 1-4-1

A	B	C	Abnormal condition	Check item
06	01	06	Cylinder stops at playback position during playback the tape.	Check the cylinder motor. Check if the cylinder and tape transport guide are clogged.
02	01	0A	Cylinder stops at FF/REW position during rewind the tape.	
06	02	06	T reel sensor is abnormal at playback position during playback the tape.	Check the capstan motor. Refer to the cases 2 and 3 described on the table "Defective analyzing table 1-4-2".
03	03	04	S reel sensor is abnormal at review/playback position during REVIEW/PLAYBACK the tape.	
01	04	00	Cassette-in and out operation cannot be performed.	Refer to the case 1 described on the table "Defective analyzing table 1-4-2".
03	05	05	Mode shift cannot be performed during shifting to REVIEW/PLAYBACK mode.	

A: System control mode, B: Abnormality No., C: Mechanical position when an abnormality occurs.

1-4-4. Check by Defective Analyzing Table

If the abnormality causes the mechanism abnormal condition, presume, confirm and treat the defective according to the defective analyzing table.

(1) Manual Mechanism Operation (Mode Shift) Method

Remove the worm gear holder with tweezers as shown in Fig.1-4-2, and remove the worm gear.
The mode of loading direction can be shifted by turning the worm wheel clockwise while pushing in the lock lever R and L of cassette holder manually. At this time, the mechanism condition is set to each position when the D mark of FL drive slider and the D mark of FL cam gear match as shown in Fig. 1-4-3.

I Power off	S1 STOP1	S2 STOP2
R Review	FR1 FF/REW1	
P Playback	FR2 FF/REW2	

Check the mechanism condition at the position the defective occurs.

Notes:

- For REVIEW, STOP2, FF/REW1, turn the worm wheel to the unloading direction and check the mechanism condition with each mark matched. Due to a rattling and deviation of the cam gear, the practical mark position for stop position carried out by the cam switch and the mark position may differ.
- When operating after removing the cassette holder, press down the tension drive lever as shown in Fig. 1-4-4 until the T slider comes AC head position since the S/T sliders start moving.

(2) Defective Parts Replacement

When a defective occurs due to the defective part (s) and the part (s) is replaced, take care the following items.

1. Especially as for the mechanical parts requiring the phase alignment, take care of the part replacement. E.g.: Assembling mode, phase alignment mark and etc.
2. As for the part (s) requiring lubricant such as a specified amount of oil or grease, apply grease or oil according to the instructions and do not stick grease or oil to the portions without allowing to stick it (especially in removal and assembly).

(3) Check after Treating the Defective

After treating the defective unit (especially replacing a defective part and/or aligning a part), first check the mechanism operation manually and confirm that no problem occurs, and then mount the mechanical deck on the VCR, turn the power ON and check the mechanism operation.

Note:

- After replacing the defective parts according to the procedure of the treatment method for the damage and phase mismatch of mechanical part, check the operation of the mechanism again, since the same (or similar) defective problem may occur due to other serious cause (in mechanism or electrical circuit) when performing the actual total check with turning the power on.

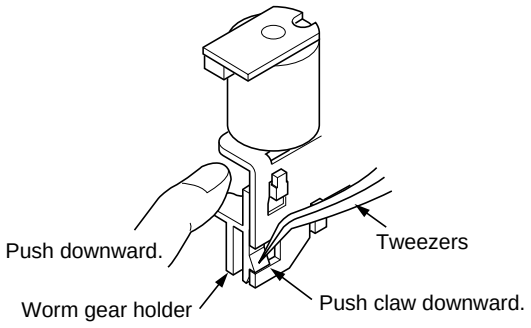


Fig. 1-4-2

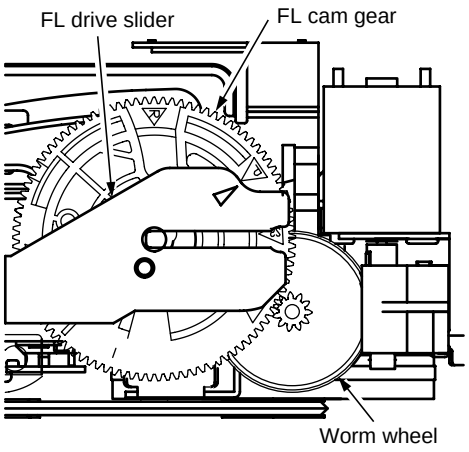


Fig. 1-4-3 Position mark (Playback position)

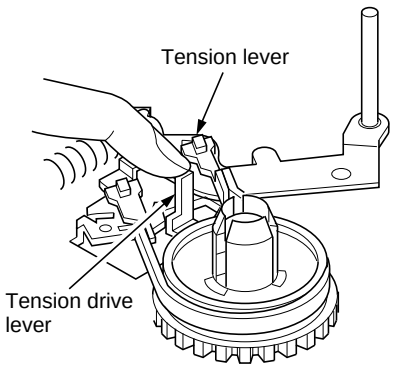


Fig. 1-4-4

Table 1-4-2 Defective analyzing table

Case	Defective phenomenon (Main items)	Presumed cause (Main cause)	Check method
1	Power does not turn on. Loading operation is defective. Mode shift operation is defective.	<General> (1) Mechanism stops due to mechanical phase mismatching.	(1) Check the mode shift "Cassette out « FF/REW position" can be performed when turning worm wheel.
	Loading operation is not performed.	(2) Loading motor does not rotate. (Part is defective. * Circuit is defective.)	(2) Check loading motor whether it turns by the outer power supply (12.5V) correctly.
	Unloading operation is not performed.	(3) S reel does not wind the tape.	(3) Refer to case 3 in this table.
2	Playback operation is not performed. Playback operation is defective.	<General> (1) Sbrake is not released. (ON) (2) T brake is not released. (ON) (3) Idler does not swing. (4) Pinch does not press.	Check mechanical position.
		(5) Capstan motor does not rotate. (Capstan motor is defective. * Circuit is defective.)	(5) Check capstan motor.
	Playback picture does not appear. Video recording can not be performed.	<In case of no mechanical problem> (6) Cylinder is defective. (* Circuit is defective.)	(6) Check cylinder assembly.
3	Playback interruption. Detective phenomenon during playback. Recording interruption.	(1) Reel rotation detection is defective. (Sensor is defective. * Circuit is defective.)	(1) Check sensor output.
		(2) Idler does not swing.	(2) Check the mechanical position.
		(3) Reel belt is removed.	(3) Check the reel belt is removed or not.
4	FF operation is not performed. FF operation is defective. REW operation is not performed. REW operation is defective. Other: REV/FF operation is not performed. Other: REV/FF operation is defective.	(1) Idler does not swing. (2) Pinch is not press-fit.	Check mechanical position for the causes (1) – (2).
		(3) Capstan motor does not rotate. (Capstan motor is defective. * Circuit is defective.)	(1) Check capstan motor.
5	REVIEW is not performed.	(1) S brake is not released. (ON) (2) T brake is not actuated. (3) Idler does not swing. (4) Pinch does not press.	Check mechanical position for the causes (1) – (4).
		(5) Capstan motor does not rotate. (Capstan motor is defective. * Circuit is defective.)	(1) Check capstan motor.
6	Slot-in is not performed. Cassette can not be inserted.	<General> (1) When the F/L is mounted on the mechanical deck, the position is not correct. (2) Tape start sensor is defective. (3) Cassette-in switch is defective.	(1) Check mechanical position. (2) Refer to item 1-4 Mechanism Check Method. (3) Check the switch.
7	Capstan servo does not work. Capstan servo is uneven. Tape speed is fast. Tape speed is slow. Tape speed is uneven. FG pulse is not output.	(1) Capstan motor is defective.	(1) Check capstan motor.
		(2) ACE head control output is defective. (* Circuit is defective.)	(1) Check ACE head. Check CTL output.
8	Audio output does not come out. Audio output is small. Audio output variation is large. Audio output is uneven. Audio distortion. Audio noise. Other: Audio is defective.	(1) ACE head is defective.	(1) Check ACE head. Check CTL output.
		(2) Tape transport adjustment is defective.	(2) Perform tape transport adjustment again after confirming tape transport condition.
		(3) Hi-Fi head (cylinder) is defective. (* Circuit is defective.)	(3) Check cylinder. Check whether B+14V is supplied.

Treatment :

If the mechanism is found out to be defective according to the procedures described above, perform the following treatment.

- Misassembling, mechanical phase mismatch ..... Repair correctly.
- Parts defect, parts damage ..... Replace parts.

If the mechanism is found out not to be defective according to the procedures above, check the circuit(s).

1-4-5. Unloading Method of Cassette in Manual

The mechanical deck can not be removed at the condition the cassette is loaded, since one of screws for mounting the mechanism deck with the chassis is located under the cassette.

If the cassette can not be unloaded even pressing the (EJECT) button, eject it using the following method.

1. Remove the worm gear holder and the worm gear, and turn the worm wheel (1) to unloading direction shown in Fig. 1-4-5 with a screwdriver etc.
2. When the S, T sliders start unloading, insert a fine driver, etc. into the rectangle hole on the bottom chassis as shown in Fig. 1-4-6 noting that no grease is attached to the tape due to tape slack. Then, turn the worm wheel to wind the tape by turning the pulley (3) of the clutch gear assembly in the arrow direction seeing the mechanical deck from the bottom.

Notes:

- The operation shown in Fig. 1-4-6 should be done with the unit stood up vertically.
- When a cassette is not ejected by turning the worm wheel (1) due to a mechanical operation stop, cut the cassette holding portion shown in Fig. 1-4-7 to eject the tape.

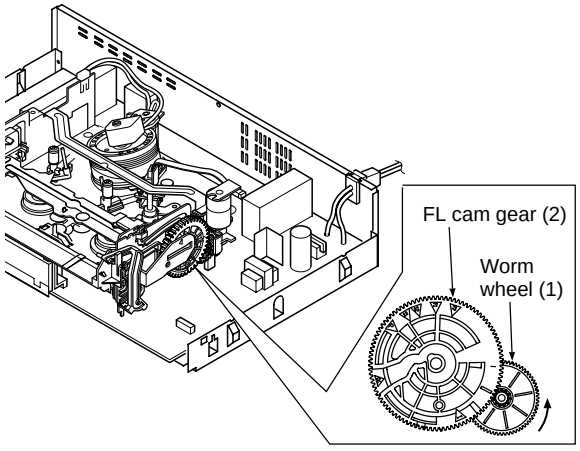


Fig. 1-4-5

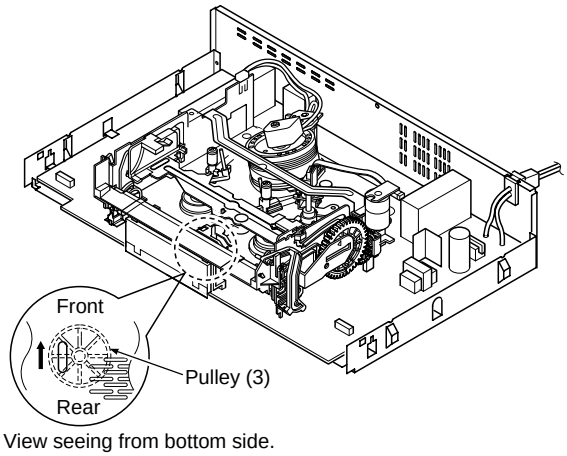


Fig. 1-4-6

1-4-6. Check Method of Each Operation Mode without Loading the Cassette

1. Put some tapes on both left and right sides of the cassette holder so that the start/end sensors are not affected by the light. (Fig. 1-4-7)
2. Press the channel up/down keys on the main unit simultaneously for not less than 5 seconds, in succession within 2 seconds after pressing channel up/down keys, press the rewind key of the remote controller.
3. Release both lock levers of the cassette holder to slot in.
4. When a cassette goes down, the rotation speed of the S reel table becomes fast. In this case, if the rotation is stopped, the mechanism starts loading the cassette. (If not stopped, the cassette is ejected.)
5. After loading is carried out, turn the opposite reel table toward the rotating reel table by hand.
6. In this status, the operations in each mode are allowed to carry out.

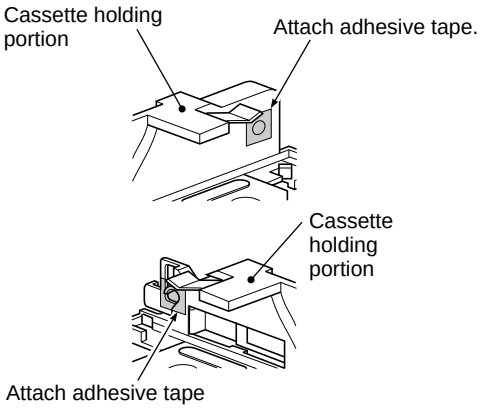


Fig. 1-4-7

Note:

- In PLAY or FF/REW mode, the auto eject will be actuated or the power will be turned off if the reel pulse, which is generated by turning the rotating side and opposite side reel tables manually, is not sent.
- Once ejection is actuated, the procedure so far is cleared, therefore when carrying out check again, perform the procedure from the beginning.
- When checking a torque cassette, perform the identical procedure.
- When a tape, guide and capstan are stained with grease, even if a tape is a normal type, its cassette type could not be distinguished, and it could not shift from CUE and REV mode and could not be forwarded and rewound.

1-5. Mechanical Deck Removing and Mounting Method

1-5-1. Cabinet Removal

1. Unplug the power supply plug (1) from the outlet.
2. Remove the three screws (3) securing the Top cover (2).
3. Pull the Top cover (2) backwards for removing.
4. Disconnect the two FFC (4) flexible flat cables.
5. Release the four claws (A) of the front panel (5) and detach the front panel (5).

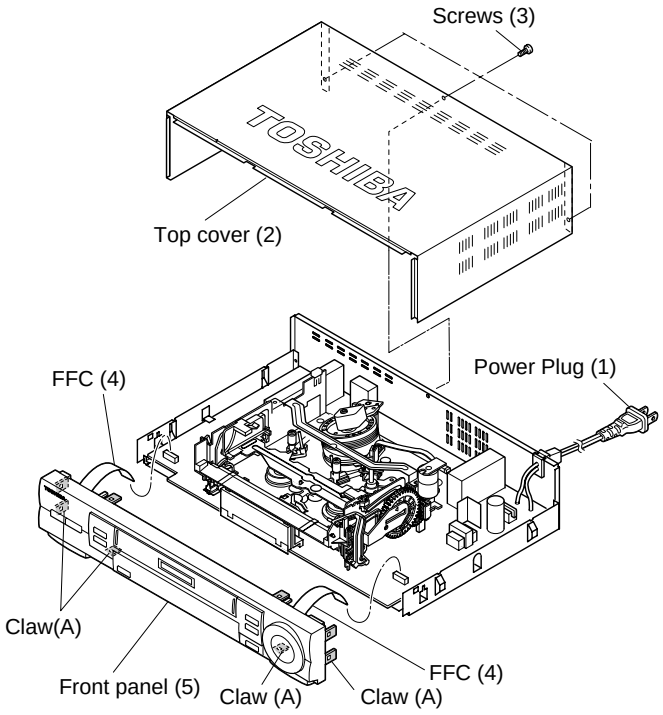


Fig. 1-5-1

1-5-2. Mechanical Deck Removal

1. Remove the cabinet. (Refer to section 1-5-1, Cabinet Removal.)
2. Disconnect the connectors (A) and (B).
3. Disconnect the FFC (C) and FFC (D).
4. Remove the screw (1) to remove the grounding wire (2).
5. Remove the two screws (3) and lift off the mechanical deck upwardly.

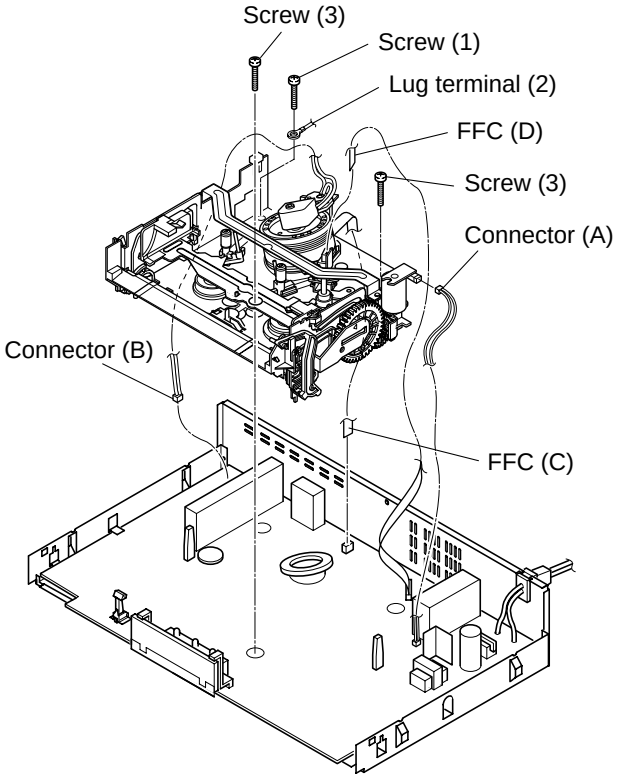


Fig. 1-5-2

6. Remove the power supply cord holder (4) from the chassis.
7. Remove the two screws (5) to detach the rear panel(6).
8. Remove the screw (7) to detach the main PC board (8).

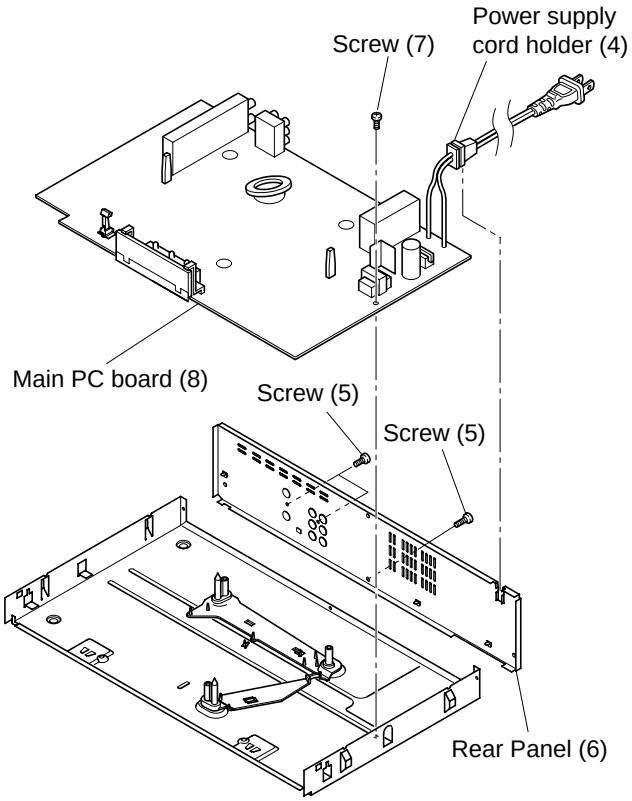


Fig. 1-5-3

1-5-3. Mechanical Deck Mounting

1. When mounting the mechanical deck, align the marks of the cam switch (1) on the main PC board.

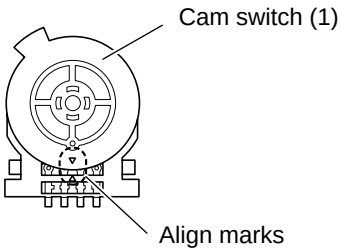


Fig. 1-5-4

2. After mounting the mechanical deck, bring it to the state that the cassette holder is just out.

1-6. Main Parts Replacement

1-6-1. Door Open Lever Replacement

1. Release the claw (1) of the door open lever (2) inserted to the hole at the left lower of the right side mechanical deck with the door open lever (2) turned to the arrow direction.
   Next, remove the door open lever (2) while lifting it up from the shaft (3) and the guide (5) portion for the door open lever (2).

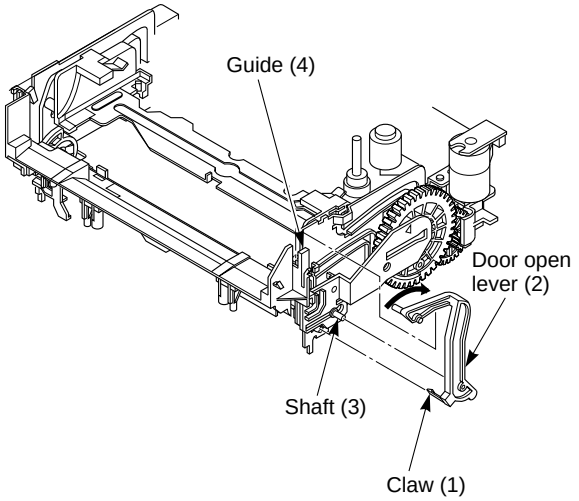


Fig. 1-6-1

2. Replace the part with the new one.
3. After replacing, mount it in the reverse order of removal.

Note:

- Mount the door open lever (2) so that it is inserted along the inside of the guide (4).

1-6-2. FL Cassette Guide Assembly Replacement

1. Remove the door open lever. (Refer to item 1-6-1.)
2. Unlock the lock lever (1), locating on both sides of the cassette holder assembly (2), by pressing. Then shift the cassette holder assembly (2) along the guide groove until the vertical slide position of the cassette holder guide grooves (A) and (B).

Note:

- Turn the worm wheel (3) clockwise if the cassette holder assembly (2) is difficult to slide.

3. Remove the FL cassette guide assembly (4) lifting it up while pressing the claw (5) on both sides of the FL cassette guide assembly (4) inside.
4. Replace the FL cassette guide assembly with new one.
5. Mount it in the reverse order of removal.

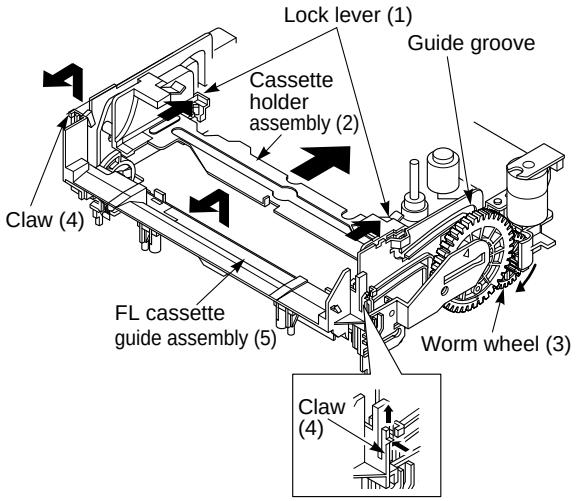


Fig. 1-6-2

1-6-3. Cassette Holder Assembly Replacement

1. Remove the door open lever. (Refer to item 1-6-1.)
2. Remove the FL cassette guide. (Refer to item 1-6-2.)
3. Move the cassette holder assembly (1) to this side.
4. Pull the right side of the cassette holder assembly (1) this side so that two bosses (2) and (3) come off from the grooves (A) and (B) of the mechanical deck, and remove the cassette holder assembly (1) from the right side by lifting slantwise while releasing the lock lever (4).

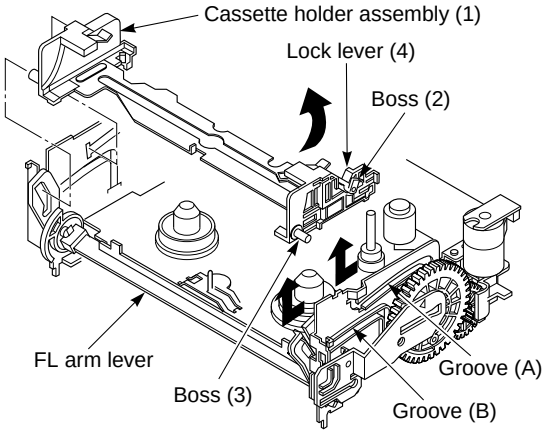


Fig. 1-6-3

5. Replace the part with new one.
6. Mount it in the reverse order of removal.

Note:

- Also, when mounting, mount it while releasing the lock lever (4).

1-6-4. FL Arm Lever Replacement

1. Remove the door open lever. (Refer to item 1-6-1.)
2. Remove the FL cassette guide assembly. (Refer to item 1-6-2.)
3. Remove the cassette holder assembly. (Refer to item 1-6-3.)
4. Release the left side claw (1) of the FL arm lever (2) from the boss (3) of the mechanical deck by pulling to the arrow direction, and remove the FL arm lever (2) by pulling to this side from the left side.

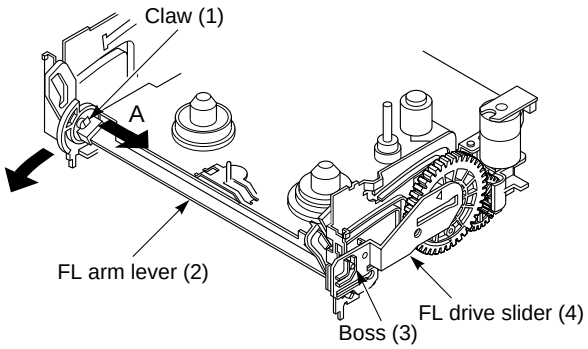


Fig. 1-6-4

5. Replace the part with new one.
6. Mount it in the reverse order of removal.

Note:

- Mount it so that the boss (3) of the FL arm lever (2) is inserted in the groove of the FL drive slider (4).

1-6-5. FL Drive Slider, Joint Gear 2, FL Cam Gear and Joint Gear 1 Replacement

1. Remove the door open lever. (Refer to item 1-6-1.)
2. Remove the FL cassette guide assembly. (Refer to item 1-6-2.)
3. Remove the cassette holder assembly. (Refer to item 1-6-3.)
4. Remove the FL arm lever. (Refer to item 1-6-4.)
5. Remove the FL drive slider (1) by sliding it to this side slightly and adjusting the mechanical deck boss (2) portion to the wider groove portion, hole (3) of the slider, and then remove the FL drive slider (1) by pulling it out from the hole (3).

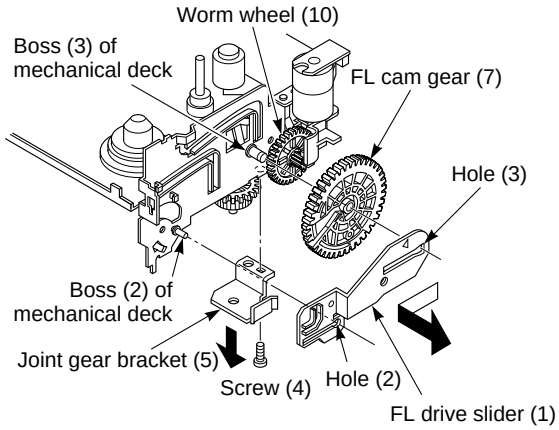


Fig. 1-6-5

6. Turn the mechanical deck upside down.
7. Remove one securing screw (4) on the joint gear bracket (5), and remove the joint gear bracket (5).
8. Remove the joint gear 2 (6).

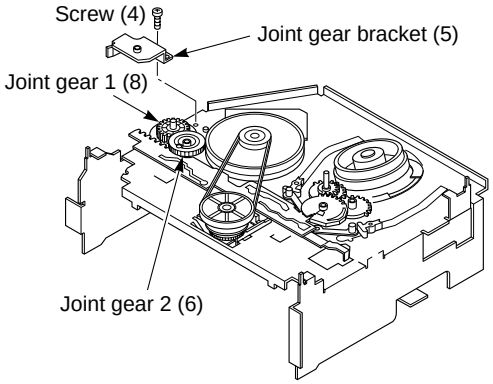


Fig. 1-6-6

9. Remove the FL cam gear (7).
10. Remove the joint gear 1 (8).
11. Replace each part with new one.
    Apply an amount of grease on the following portion of the new parts. (Refer to Figs. 1-6-7 to 1-6-9.)

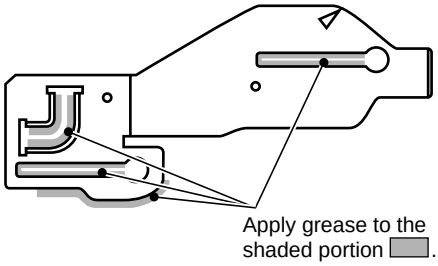


Fig. 1-6-7 FL drive slider

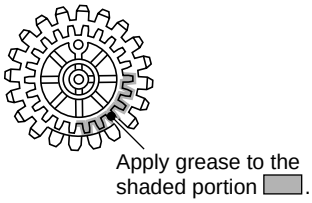


Fig. 1-6-8 Joint Gear 1

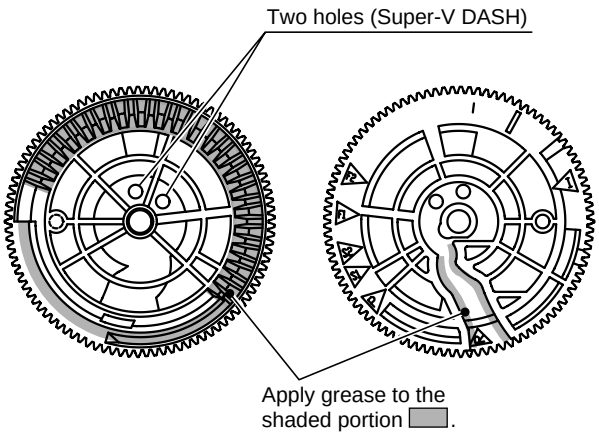


Fig. 1-6-9 FL cam gear

12. When mounting the joint gear 1 (8), mount it so that the cutout portion of the gear is faced with the direction of the FL cam gear (7).

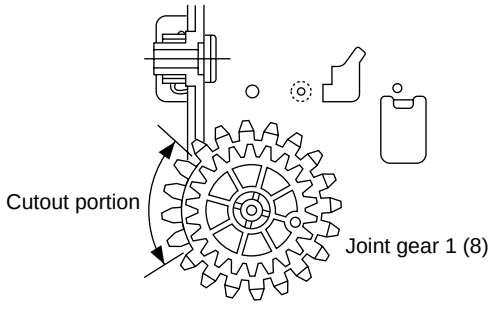


Fig. 1-6-10

13. When mounting the FL cam gear (7), align the mark of the FL cam gear (7) with the center of the worm wheel (9).

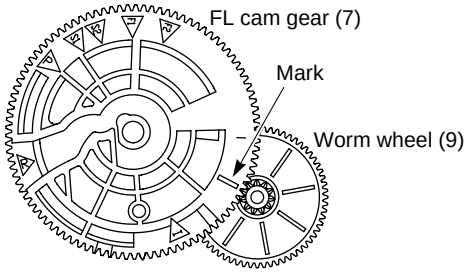


Fig. 1-6-11

14. When mounting the joint gear 2 (6), align the mark of the joint gear (8) with the mark of the cam slider (10).

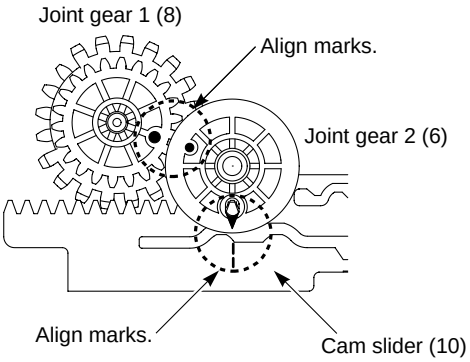


Fig. 1-6-12

15. Mount each part in the reverse order of removal.

1-6-6. Worm Gear, Worm Gear Holder, Loading Motor and Worm Wheel Replacement

1. Release the claw (1) of the worm gear holder (2) from the cutout portion of the mechanical deck by bending it to the arrow direction, and remove the worm gear holder (2) by pulling downward.
2. Remove the worm gear (3).
3. Before removing the worm wheel (3), first remove the FL cam gear. (Refer to item 1-6-5.)
4. Remove the worm wheel (4).
5. Remove one securing screw (5) on the loading motor (6), and remove the loading motor (6).

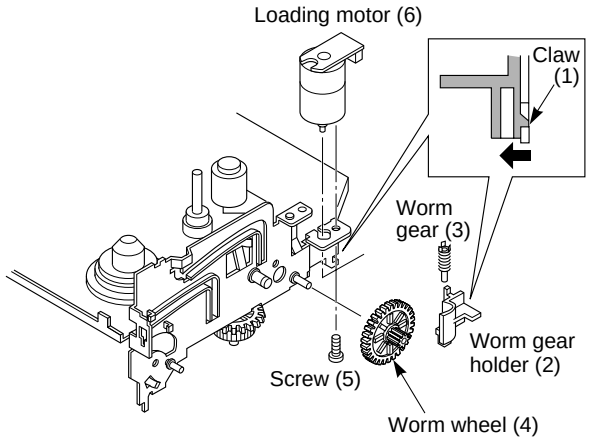


Fig. 1-6-13

6. Replace each part with new one.
   After replacing with new parts, apply an amount of grease on the following portions.

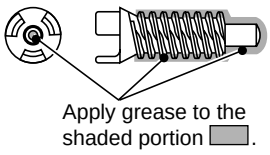


Fig. 1-6-14 Worm gear

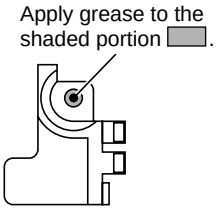


Fig. 1-6-15 Worm gear holder

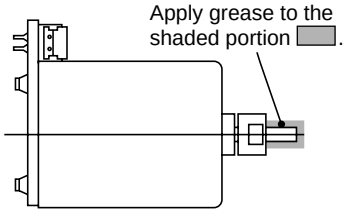


Fig. 1-6-16 Loading motor

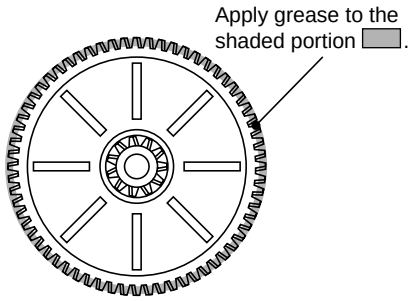


Fig. 1-6-17 Worm wheel

7. Mount the parts in the reverse order of removal.

Note:

- After mounting the worm gear holder (2), check that the claw (1) is locked properly.

1-6-7. Loading Drive Gear, Cam Slider, S, T Loading Lever Assemblies, Pinch Drive Lever and Tension Drive Lever Replacement

1. Turn the mechanical deck upside down.
2. Remove the reel belt.
3. Remove one securing screw on the joint gear bracket, and remove the joint gear bracket. (Refer to item 1-6-5.)
4. Remove the joint gear 2. (Refer to item 1-6-5.)
5. Release the claw (1) of the loading drive gear (2) from the groove of the mechanical deck, and remove the loading drive gear (2).
6. Remove the cam slider (3).

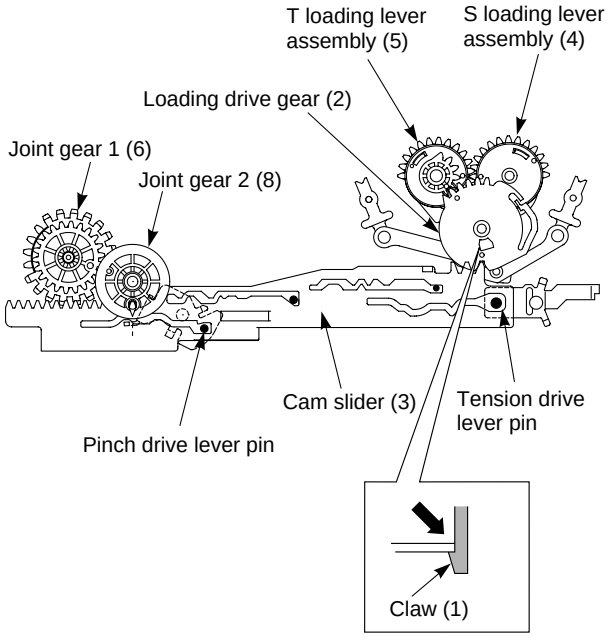


Fig. 1-6-18

7. Remove the S, T loading lever assemblies (4) and (5).
8. When removing the pinch drive lever (6), first, remove the cassette door guide, pinch assembly, and the joint lever (Refer to item 1-6-13.), and then remove the T reel table (Refer to item 1-6-11.). Next, pull out the pinch drive lever (6) after turning it counterclockwise from the bottom side of the mechanical deck.

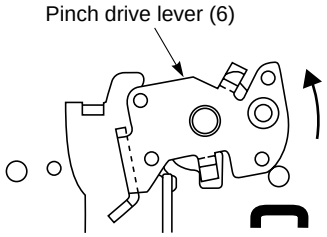


Fig. 1-6-19 Bottom side of mechanical deck

9. When removing the tension drive lever (7), first, remove the S reel table (Refer to item 1-6-11.) Next, turn the band brake mounting portion counterclockwise from the bottom side of the mechanical deck, and then remove the tension drive lever (7) after turning it clockwise.

Notes:

- When turning the band brake mounting portion, do it by inserting a screwdriver into the rectangle hole. At this time, pay attention not to bent it upward and downward.
- After mounting, check the tension post position, and perform the adjustment and the confirmation of the back tension. (Refer to the section 1-7-1. Tension Post Position Check, and 1-7-2. (2) Reel Torque Check and Back Tension Check.)

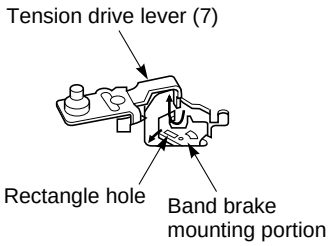


Fig. 1-6-20 Bottom side of mechanical deck

10. Replace each part with new one.
    Apply an amount of grease on the following portions of the new parts.

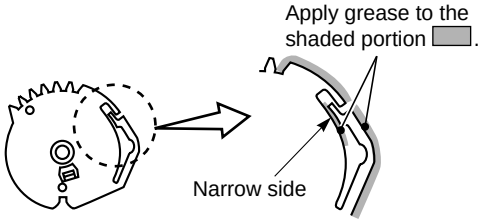


Fig. 1-6-21 Loading drive gear

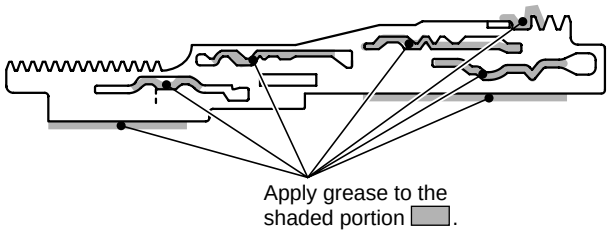


Fig. 1-6-22 Cam slider

11. When mounting the S, T loading lever assembly (4) and (5), align the marks.

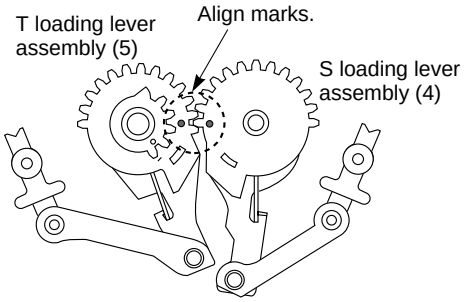


Fig. 1-6-23

12. When mounting the cam slider (3), loading drive gear (2), and the joint gear 2 (8), align the marks of the marking portions.

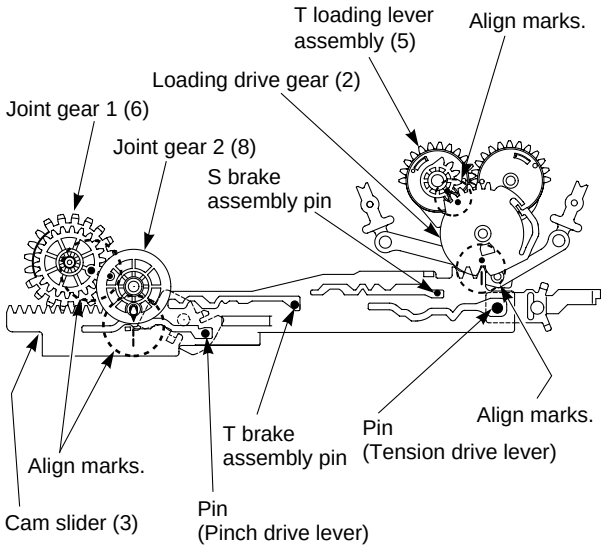


Fig. 1-6-24

13. Mount each part in the reverse order of removal.

1-6-8. Tension Lever, Band Brake and Tension Sleeve Replacement

1. Remove the S brake. (Refer to item 1-6-9.)
2. Remove the tension spring (1).
3. Lift up slightly the hole side of the tension sleeve (2) mounted to the mechanical deck, and turn it to the left or right direction, and then remove the tension sleeve (2) by adjusting the claw of the tension sleeve (2) to the cutout portion of the mechanical deck. Also remove the tension lever (3).

Note:

- When replacing the tension lever (3) and the band brake (4), removing the tension sleeve is not required. Remove it after turning clockwise by inserting the screwdriver to the rectangle hole.
  At this time, pay attention not to bent it up and down directions.

4. Remove the band brake (4) of the tension lever (3) side by adjusting the claw of the band brake (4) to the groove of the tension lever (3) turning it in the right direction.
5. Remove the band brake (4) by adjusting the claw of the band brake (4) to the groove of the band brake mounting portion at the mechanical deck side.
6. Replace each part with new one.
7. Mount it in the reverse order of removal.

Note:

- After replacing the tension lever (3), apply an amount of oil to the support post.
- Take care not to dirty, bent, and damage the felt surface of the band brake (4).

8. After mounting, confirm the tension post position, also confirm the adjustment and back tension. (Refer to the section 1-7-1. Tension Post Position Check, and 1-7-2. (2) Reel Torque Check and Back Tension Check.)
9. After replacing, perform the adjustment according to the linearity adjustment of the tape transport system adjustment item.

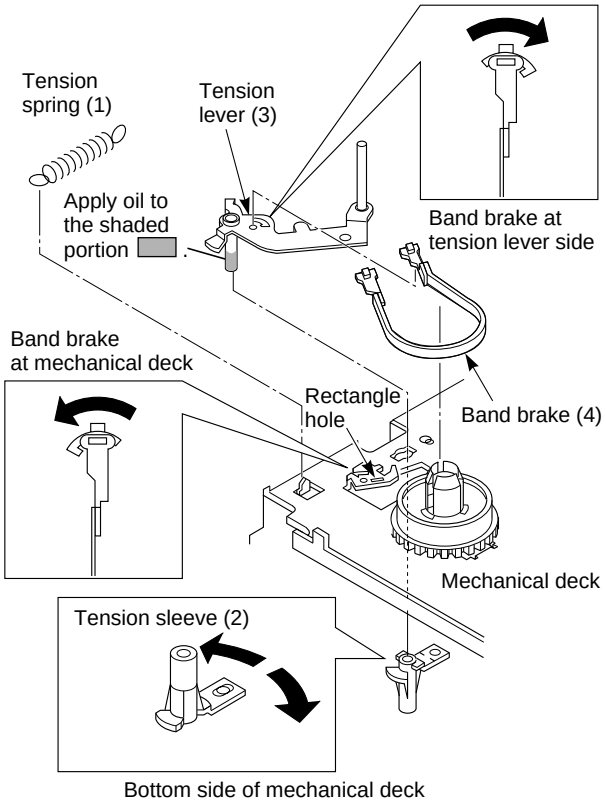


Fig. 1-6-25

1-6-9. S, T Brake Assemblies and Idle Lever Assembly Replacement

1. Remove the brake spring (1) located between the S, T brake assemblies (2) and (3) from the T brake assembly side.
2. Remove three claws (4) and (5) of S, T brake assemblies (2) and (3). Then remove the S, T brake assemblies (2) and (3).
   If it is difficult to remove, push the claws from the bottom side. Since two claws (5) are provided with the T brake assembly (3), remove both claws.
3. Push the idle lever (6) to the cylinder direction (shown by the arrow "A") and remove the idle lever (6).

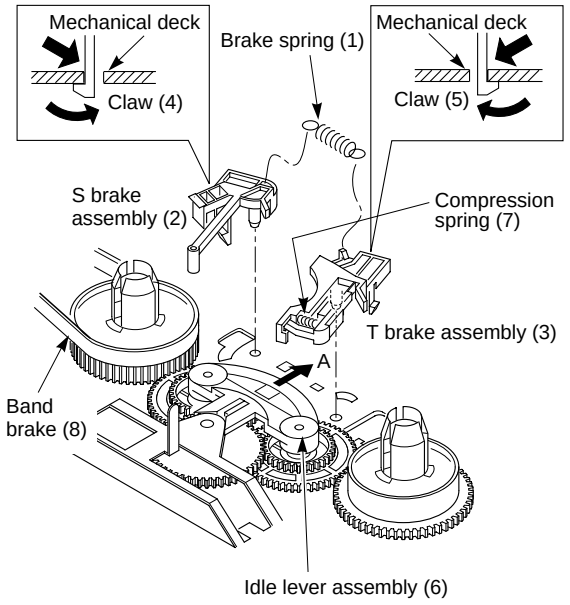


Fig. 1-6-26

4. Replace each part to new ones.
5. Mount it in the reverse order of removal.

Notes:

- Check that the pad for T brake lever assembly and compression spring (7) are attached.
  When mounting the T brake lever assembly, do not touch the pad to the T reel table.
- Before mounting the brake spring (1), check that the S, T brake assemblies (2) and (3) move smoothly.
- When replacing the S brake assembly (4), do not damage the band brake (8).

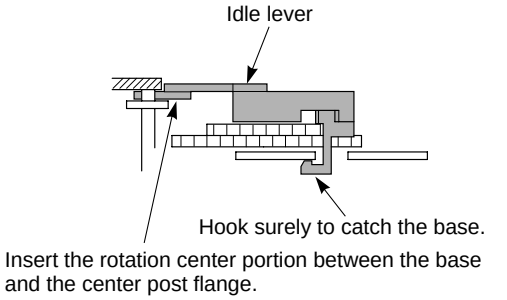


Fig. 1-6-27

1-6-10. Holder Clutch Assembly, Center Gear Assembly and Up/Down lever Assembly Replacement

1. When replacing the center gear assembly (1) and Up/Down lever assembly (2), remove the S, T brake assemblies and idle lever assembly (refer to item 1-6-9) and cam slider (refer to Fig. 1-6-7) in advance.
2. Remove the stop ring (3) fixing the holder clutch assembly (4) and remove the holder clutch assembly (4).
3. Release two claws (5) of the Up/Down lever assembly (2) from the mechanical deck and remove the Up/Down lever assembly (2) with the center gear assembly (1) attached.

Notes:

- After cleaning the center post (6) by using a cleaning kit, apply oil to the upper portion of the center post (6) drop by drop. (Performs when replacing the center gear assembly (1) Up/Down lever assembly (2) and the holder clutch assembly (4).)
- Apply grease to the center gear assembly (1) (Performs when replacing the center gear assembly (1) and the Up/Down lever assembly (2).)

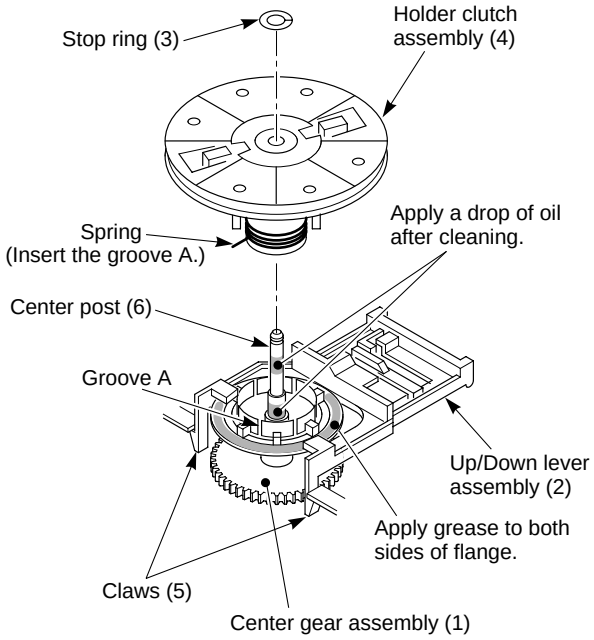

Stop ring (3)
Holder clutch assembly (4)
Spring (Insert the groove A.)
Apply a drop of oil after cleaning.
Center post (6)
Groove A
Up/Down lever assembly (2)
Apply grease to both sides of flange.
Claws (5)
Center gear assembly (1)

Fig. 1-6-28

4. Replace each part with new one.
5. After replacing, mount it in the reverse order of removal.

Note:

- Check the reel torque by using a torque cassette. (Performs when replacing the clutch gear assembly and the idle lever assembly.)

6. Mount the center gear assembly (1) and the Up/Down lever assembly (2) together.
   First, insert the claws (5) of the Up/Down lever assembly (2) to the base and insert the center gear assembly (1) to the center post (6) with the flange of the center gear assembly (1) positioned lower than the guide (8).

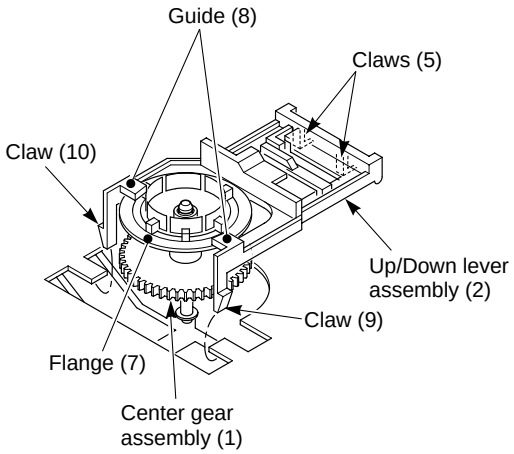


Fig. 1-6-29

Furthermore, push the parts downward until the claws (9) and (10) of the Up/Down lever assembly (2) catch the mechanical deck.

Note:

- Check the spring of the holder clutch assembly is set correctly.

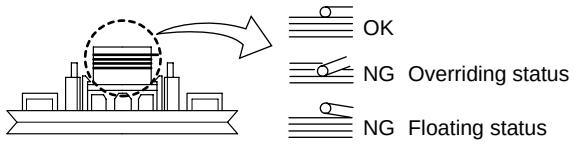


Fig. 1-6-30

Notes:

- Do not push the spring of the holder clutch assembly to set along any of 6 grooves of the center gear assembly (1). The spring is set by its own weight. After confirming the spring is set correctly, tighten the parts with a stop ring (3).
- The stop ring (3) with its slit opened is not allowed to use again. Be sure to change the stop ring (3) to new one.

1-6-11. S,T Reel Tables Replacement

1. Remove the S, T reel table. (Refer to item 1-6-9.)
2. Remove the band brake. (Refer to item 1-6-8.)
3. Remove the S, T reel tables (1) and (2) pulling it from the reel shafts (3) and (4).
4. Apply an amount of oil to the top portion and sitting portion of the reel shafts (3) and (4) after cleaning the reel shafts (3) and (4) with the cleaning kit.
5. Replace each part with new one.
6. Mount it in the reverse order of removal.

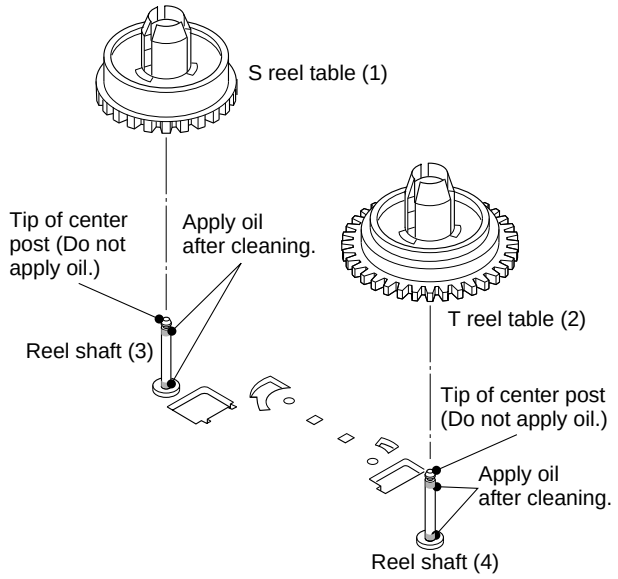

S reel table (1)
Tip of center post (Do not apply oil.)
Apply oil after cleaning.
Reel shaft (3)
T reel table (2)
Tip of center post (Do not apply oil.)
Apply oil after cleaning.
Reel shaft (4)

Fig. 1-6-31

1-6-12. S,T Slider Assemblies Replacement

1. Remove the S, T loading lever assemblies. (Refer to item 1-6-7.)
2. Remove the S brake. (Refer to item 1-6-9.)
3. Remove the tension lever. (Refer to item 1-6-8.)
4. When replacing the T slider assembly (1), remove the slider cam. If it is difficult to remove, remove the holder clutch assembly and Up/Down lever assembly in advance. (Refer to item 1-6-10.)
5. Remove the S, T slider assemblies (2) and (1) by sliding to the cutout portion of the S, T loading grooves (3) and (4) on the mechanical deck.
6. Replace each part with new one.
7. Mount it in the reverse order of removal.
8. After mounting, perform the adjustment according to the 1-7-3. Tape Transport System Adjustment.

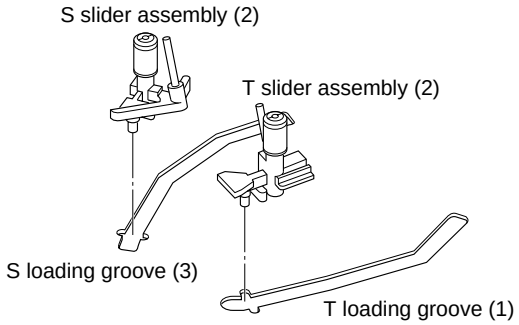


Fig. 1-6-32

1-6-13. Pinch Assembly, No. 9 Guide Lever and Cassette Door Guide Replacement

1. Lift the claw (1) of the cassette door guide (2), and remove the cassette door guide (2) by turning it clockwise.
2. Remove the pinch assembly (3) pulling it up straight from the pinch support post (4).
3. Remove the joint lever (5) which joints the pinch drive lever (6) and the pinch assembly (3) and remove the pinch drive spring (7) from the pinch drive lever side.
4. Remove the spring between the No. 9 guide lever (8) and the mechanical deck.
5. Pivot the No.9 guide lever in loading direction (a) and then remove it by lifting it up at the pivot center (b).
6. For reattachment, after fitting the flange of the No.9 guide lever under the brim of the base, set the pivot center.

Note:

- There are 2 types in the No. 9 guide lever: a and b.

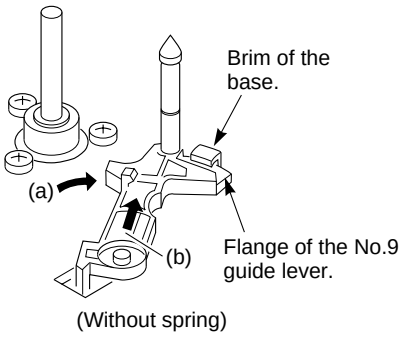


Fig. 1-6-33 Type a

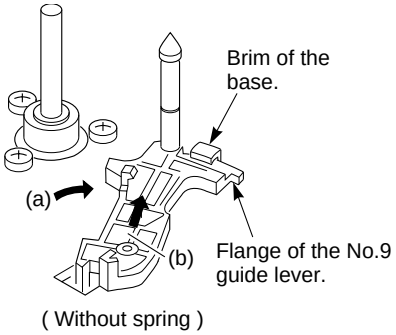


Fig. 1-6-34 Type b

7. Replace each part with new one.
8. Mount it in the reverse order of removal.
9. After mounting, perform the adjustment according to the 1-7-3. Tape Transport System Adjustment.

Notes:

- After mounting the cassette door guide (2), check that the claw (1) is locked properly.
- Take care not to touch the surface of the pinch roller, and not to stick the grease.
- Be sure to apply an amount of grease to the portion contacted with the pinch assembly (3) around the pinch support post (4).
- After replacing the No. 9 guide lever (8), be sure to apply an amount of oil around the support post, and apply an amount of grease to the end of the No. 9guide post (10).
  Also, pay attention not to stick the grease on the transportation surface of the No. 9 guide lever.
- Confirm the guide post end of the No. 9 guide lever (8) touches the top surface of the mechanical deck.
- Insert the other end of the pinch drive spring (7) into the small hole of the mechanical deck.

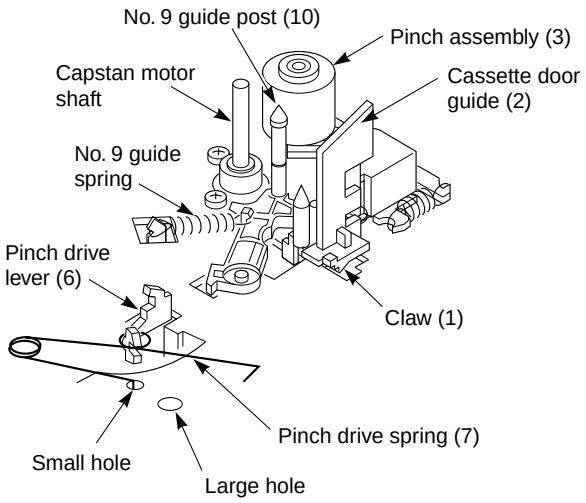


Fig. 1-6-35

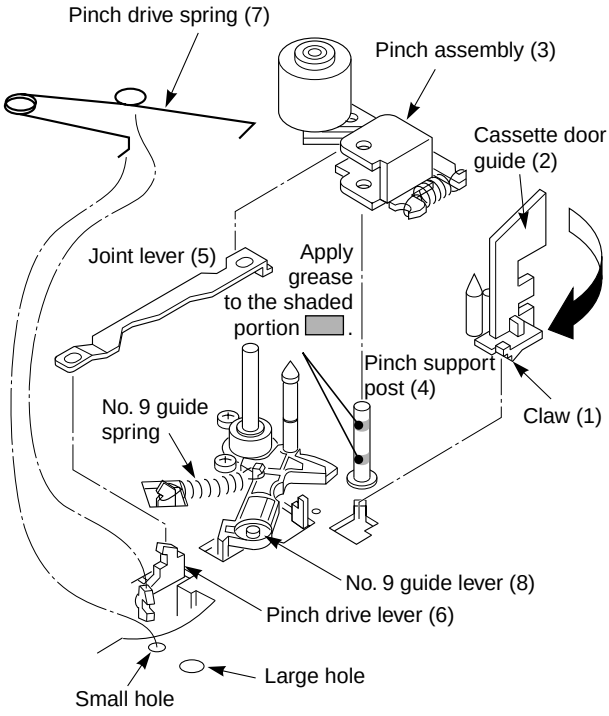


Fig. 1-6-36

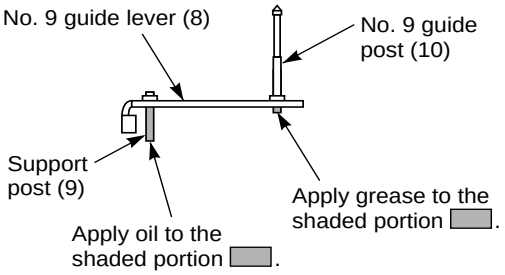


Fig. 1-6-37

1-6-14. FE Head Replacement

1. Remove screw (1) on the FE head (2), and remove the FE head (2).
2. Replace the part with new one.
3. Mount it in the reverse order of removal.
4. After mounting, perform the adjustment according to the 1-7-3. Tape Transport System Adjustment.

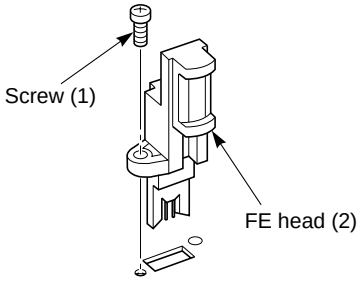


Fig. 1-6-38

1-6-15. ACE Head Assembly Replacement

1. Remove the FFC (1) from the connector.
2. Remove one securing screw (2) on the ACE head assembly (3), and remove the ACE head assembly (3).
3. Replace the part with new one.

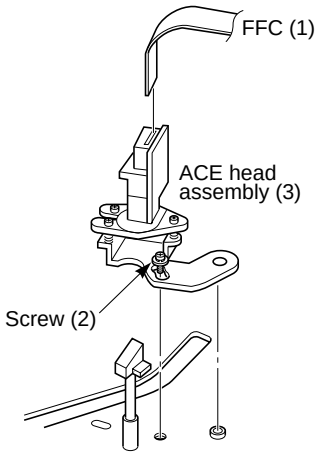


Fig. 1-6-39

4. When mounting the ACE head assembly (3) to the mechanical deck, mount it by aligning the slit (A) of the mechanical deck with the slit (B) of the ACE head bracket (4) after aligning the hole (5) of the ACE head bracket (4) to the boss (6) of the mechanical deck.

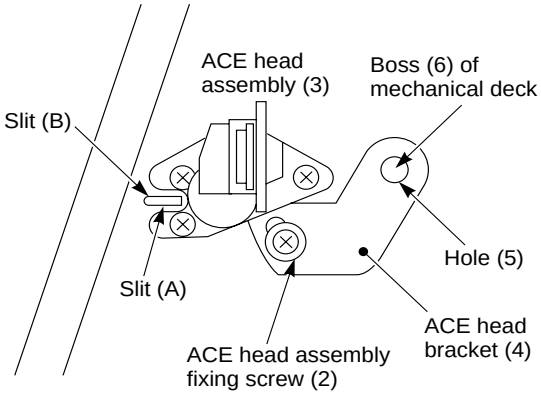


Fig. 1-6-40

(5) Mount the part in the reverse order of removal.
(6) After mounting, perform the adjustment according to the 1-7-3. Tape Transport System Adjustment.

Note:

- Take care when replacing, since the part number of ACE head assembly is different between the models.

1-6-16. Head Cleaner Assembly and Head Cleaner Sleeve Replacement

1. Release the hook (1) of the head cleaner assembly (2) from the mechanical deck, and pulling out the head cleaner assembly (3) upward.
2. When replacing the head cleaner sleeve (3), pull it out by lifting the “A” portion and turning it in 90 degrees.

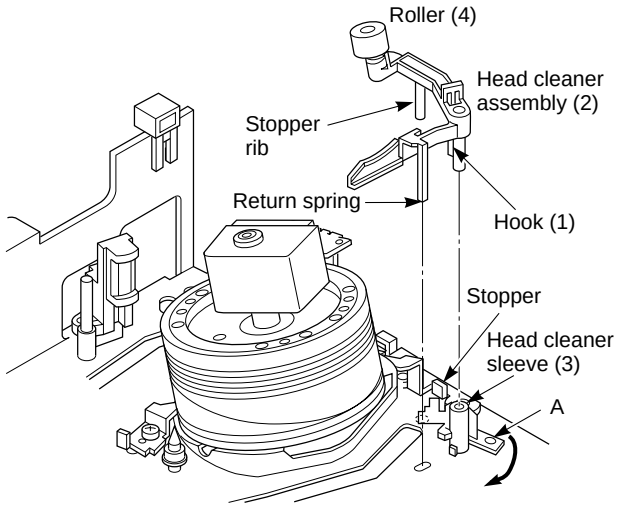


Fig. 1-6-41

3. Replace each part with new one.
4. Mount it in the reverse order of removal.

Notes:

- Take care not to stick the grease, oil and etc. on the roller (4).
- When mounting the head cleaner assembly (2), mount it so that the stopper rib (5) sits inside (cylinder side) of the cylinder mounting bracket stopper (6). Also, be sure that the return spring (7) is inserted correctly in the hole of the main base.

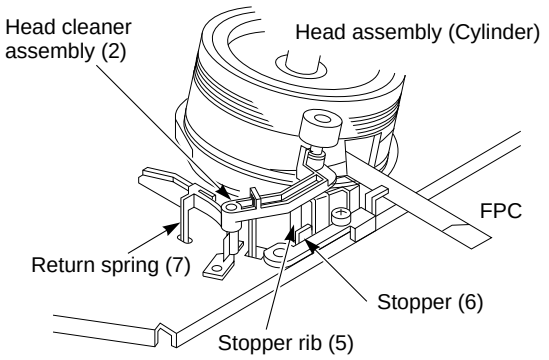


Fig. 1-6-42

1-6-17. Slip Ring Assembly Replacement

1. Remove two connectors (1) and (2) (cylinder side and PC board side) of the slip ring assembly (3).

Note:

- The mounting or removal of the slip ring connector (1) on the cylinder side should be carried out by using tweezers.

2. Remove the slip ring assembly fixing screw (4).
3. Remove the slip ring assembly (3).
4. Replace the slip ring assembly (3) with new one.

Notes:

- Do not apply force to the head assembly (cylinder) (5).
- When mounting the slip ring assembly (3), first, insert the shaft to the center hole of the coupling (6).
- Connect the slip ring connectors (1) and (2) with their insertion direction corrected. (Connect the slip ring connector (1) on the cylinder side with its wire holder portion set to the cylinder center side.)
- When tightening the slip ring assembly fixing screw (4), be sure to tighten the lug terminal (6) together.
- After mounting the parts, confirm no slack on the connector lead wire on the PC board side is found. (If a slack is found, surely wire the connector without slackened.)

5. After replacing, mount the part in the reverse order of the removal.

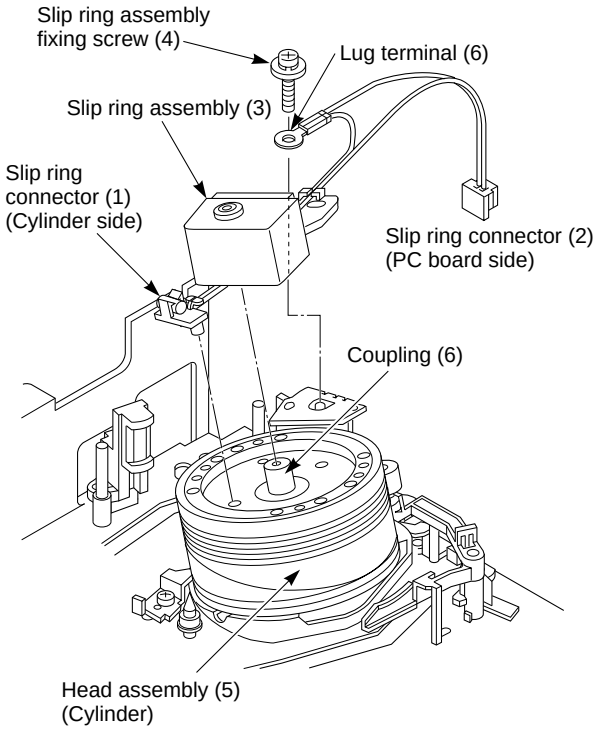

Slip ring assembly fixing screw (4)
Lug terminal (6)
Slip ring assembly (3)
Slip ring connector (1) (Cylinder side)
Slip ring connector (2) (PC board side)
Coupling (6)
Head assembly (5) (Cylinder)

Fig. 1-6-43

1-6-18. Cylinder Holding Plates Replacement

1. Remove the head cleaner assembly. (Refer to item 1-6-16.)
2. Remove three securing screws (1), (2) and (3) on the cylinder holding plates (4), (5) and (6) Remove the cylinder holding plates (4), (5) and (6) by sliding in each direction shown by the arrows.

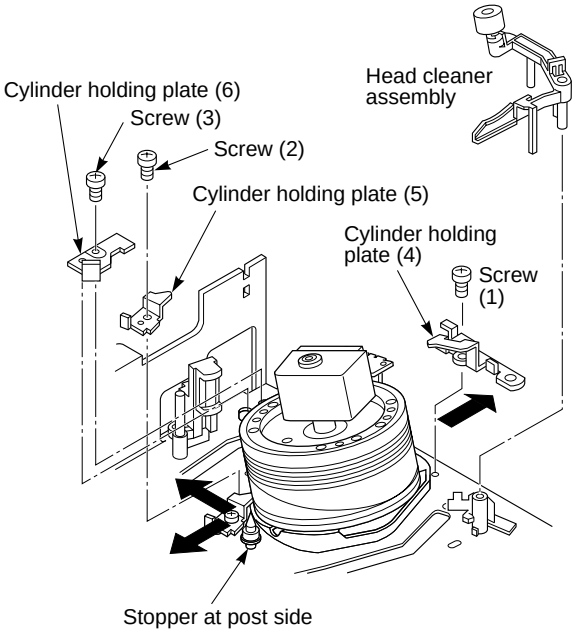


Fig. 1-6-44

3. Replace each part with new one.
4. Mount it in the reverse order of removal.
5. Fix the cylinder holding plate (4) and (5) with screws (1) and (2) while pushing slightly in the directions shown by the arrows. Fix the cylinder holding plate (6) with screws (3) after matching the boss on the mechanical deck to the boss hole on the cylinder holding plate (6).

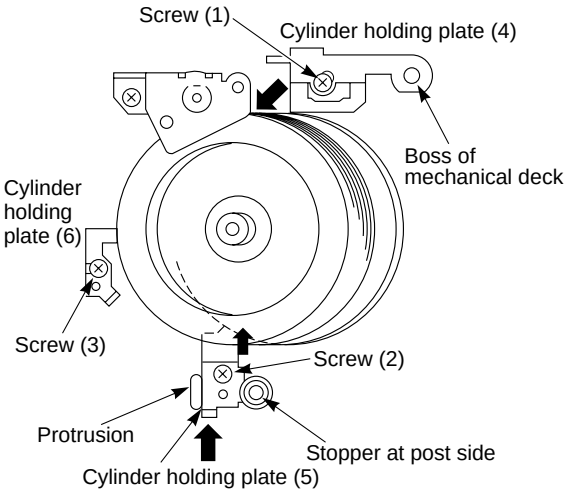


Fig. 1-6-45

Notes:

- Tightening order of the securing screws (1), (2) and (3) is 294 to 392 mN•m (3 to 4kg•cm).
- Take care of the position inserting the FPC when mounting the cylinder holding plate (4). (Refer to item 1-6-19.)
- When replacing the cylinder holding plate (6), take care not to damage the cylinder and the tape guides etc.
  Note that the screw (3) of the cylinder holding plage (5) does not touch with the head assembly (cylinder).

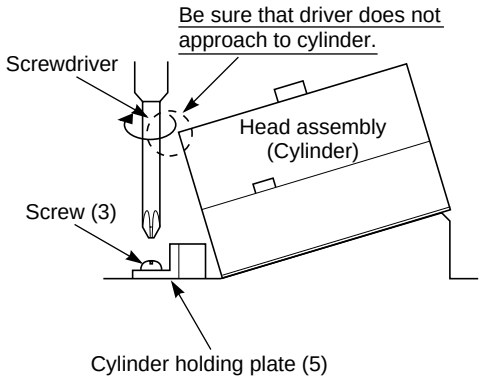


Fig. 1-6-46

1-6-19. Head Assembly (Cylinder) Inspection and Replacement

<Inspection>

1. Check if the tape transport surface on the head assembly (cylinder) is not damaged.
2. Check if the rotation of the head assembly (cylinder) is not abnormal.
3. Check if the video head is not damaged and worn out.
   (It can be checked easier by using the head checker.)
4. Check if the video head is not clogged. (When it can't be eliminated by cleaning)
5. Check if the FPC (A) is not damaged.

If some abnormality is found after checking above “1.” to “5.”, replace the head assembly (cylinder) with new one.

<Replacement>

1. Remove the slip ring assembly. (Refer to item 1-6-17.)
2. Remove the head cleaner assembly. (Refer to item 1-6-16.)
3. Remove the FPC (1) from the main PC Board.
4. Remove the screw (2) fixing the slip ring bracket (3) and remove the slip ring bracket (3).
5. Remove the cylinder holding plates (4), (5) and (6). (Refer to item 1-6-19.)
6. Remove the head assembly (cylinder) (7).
7. Replace the head assembly (cylinder) (7) with new one.
8. When mounting, take care of the direction of the head assembly (cylinder) (7).
9. Remount the head assembly (cylinder) (7) in the reverse order of removal. Fix it pressing slightly in the direction shown by the arrow A for the cylinder holding plate (4) pressing slightly in the direction shown by the arrow B, and the cylinder holding plate (4) pressing slightly in the direction shown by the arrow C for the cylinder holding plate (6). (Tightening torque : 294 to 392 mN•m (3 to 4kg•cm))
   Fix the slip ring bracket (1) with the screw (2) after adjusting the boss of the mechanical deck to the boss hole of the slip ring bracket (3). (Tightening torque : 294 to 392 mN•m (3 to 4kg•cm))

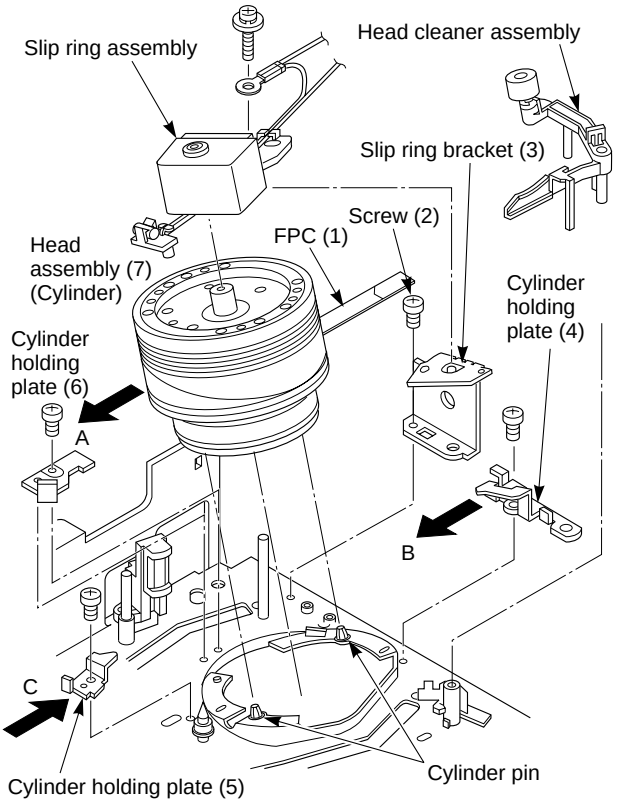


Fig. 1-6-47

Notes:

- When remounting the cylinder holding plate (4), after confirming that the FPC (1) is hooked at the groove on the lower head assembly properly, insert the FPC (1) under the tip of the cylinder holding plate.
  However, this is not applied for the type which has no cylinder window.
- When replacing, take much care not to touch the video head directly and damage the cylinder.

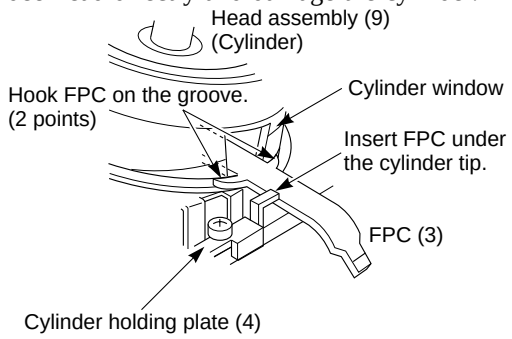

Head assembly (9) (Cylinder)
Hook FPC on the groove. (2 points)
Cylinder window
Insert FPC under the cylinder tip.
FPC (3)
Cylinder holding plate (4)

Fig. 1-6-48

9. After mounting, perform the adjustment according to the 1-7-3. Tape Transportation System Adjustment.

1-6-20. Capstan Motor Assembly and Reel Belt Replacement

1. Remove the reel belt (1).
2. Remove three screws (2) from the front side of the mechanical deck while keeping the capstan motor assembly (3) of the mechanical deck bottom side.
3. Replace the capstan motor with new one.
4. Insert the capstan motor assembly (2) from the bottom side of the mechanical deck while taking care not to hit or damage the capstan motor shaft (4) and whole motor, so that the positioning hole of the mechanical deck and the positioning hole of the capstan motor assembly fit.
5. Fix the capstan motor assembly (3) with three screws (2) by tightening evenly while keeping the capstan motor assembly (3) of the mechanical deck bottom side.
   At this time, adjust it so that the hole of the mechanical deck and the positioning hole of the capstan motor is fit.

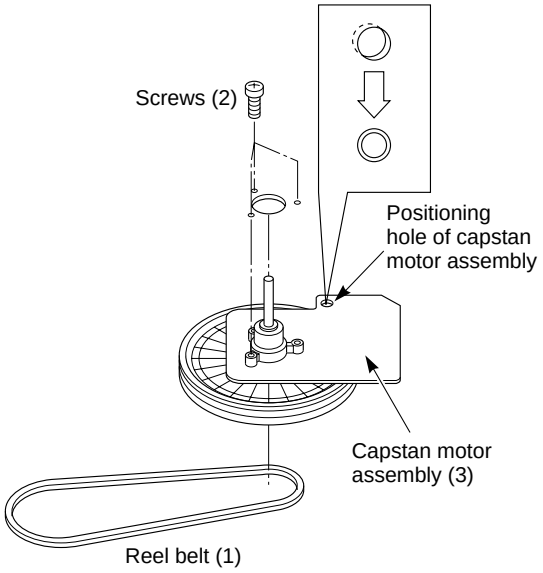


Fig. 1-6-49

Notes:

- Do not use once-removed screws again.
- When mounting, floating of screw is not allowed.

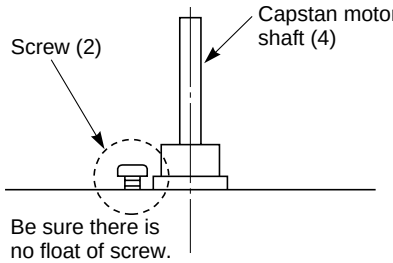


Fig. 1-6-50

6. After replacing, mount it in the reverse order of removal.

Note:

- In this case, take care not to twist the reel belt and stick the grease.

7. After mounting, perform the adjustment according to the 1-7-3. Tape Transportation System Adjustment.

1-6-21. No. 8 Guide Cap Replacement

1. Press the No. 8 guide cap for replacement forcibly after pulling out the No. 8 guide cap (1) from the No. 8 guide (2).
2. Mount the No. 8 guide cap (1) by facing the slant surface to cassette side.

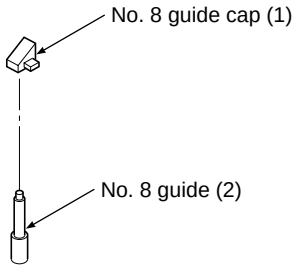


Fig. 1-6-51

1-6-22. S Impedance Roller Replacement

1. Pull out the S impedance roller assembly (1) upward.
2. Apply oil to the shaft (2).
3. Insert a new S impedance roller to the shaft (2).
4. After replacing, perform the adjustment according to the 1-7-3. Tape Transportation System Adjustment.

Notes:

- S impedance roller is provided depending on models.
- The top cover of the VCR unit supports the impedance roller to prevent from pulling out. So, when standing the unit with its top cover removed, be sure to remove the impedance roller in advance.
- Do not touch the tape running portion on the roller surface directly by hand and do not attach oil, etc. on it.

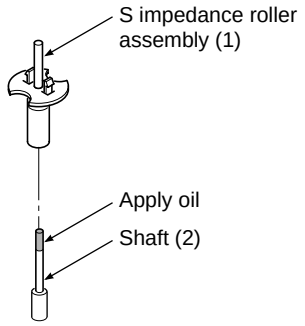


Fig. 1-6-52

1-7. Check and Adjustment

1-7-1. Check of Tension Post Position

1. Turn the worm wheel clockwise after removing the cassette holder assembly on the front loading mechanism, and set the cam gear at playback mode. (Refer to Fig. 1-4-3 Cam Position.)
2. Turn the S reel table (1) clockwise two rounds slowly.
3. While turning the S reel table (1), insert a slot type screwdriver to the rectangle hole of the adjuster portion (2) so that the outer periphery of the left end on the tension lever (3) is put on the marking of the mechanical deck, and adjust it by turning clockwise or counterclockwise.
4. After turning the S reel clockwise again, check that the deviation to the marking is within 1 mm.

Notes:

- There is a long mark at the position of 1.3 mm from the round surface of the mechanical deck. Make sure the position of the mark when adjusting.
- When turning the adjuster portion (3), take care not to apply force in upper and lower directions.

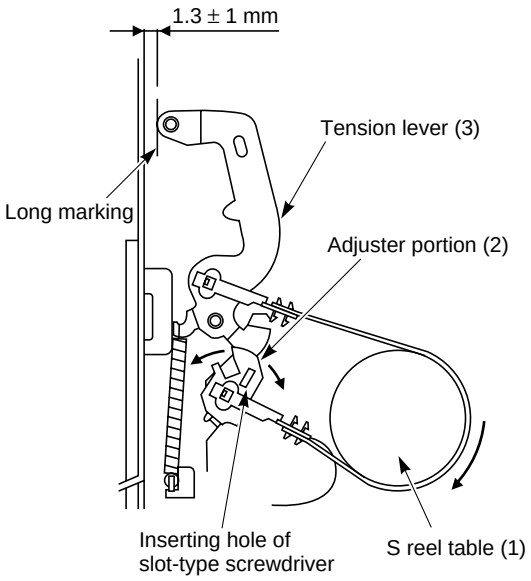


Fig. 1-7-1

1-7-2. Reel Torque Check

(1) Reel Torque

1. REV..... supply side
   Poor torque may not wind the tape. On the other hand, excessive torque will cause damage to the tape during REVIEW mode.
2. REC/PLAY ..... take-up side
   Poor torque does not rewind the tape to the end. If excessive torque, the tape may be stretched by excessive tension.
3. Inspection
   Rewind the torque cassette to the end, then check the torque value shown below:
   Review (SP x7)
   14.2 ± 3.9 mN•m (145 ± 40 g•cm)
   REC/PLAY
   8.1 ± 2.7 mN•m (82.5 ± 27.5 g•cm)
   For the checking method, refer to the following item (2).

(2) Reel Torque and Back Tension Check

1. Record a signal on the torque cassette tape (KT-300NR) in the SP mode.
2. Load the torque cassette tape (KT-300NR) in the VCR and feed it forward until the end of the tape, before proceeding with measurement.
3. Set the VCR to the REVIEW mode and feed the tape for about 15s, and then make sure the take-up torque described above is obtained while observing the left torque meter.
4. After completion of step “3.”, feed forward to tape start position and set the VCR to the PLAY mode. After feeding the tape for about 30s, check the torque measures 4.4 to 9.8 mN•m (45 to 100 g•cm) reading the right torque meter. Also, check the back tension torque measures 4 to 7 mN•m (41 to 71 g•cm) reading the left torque meter.
5. If the review torque and playback torque are out of limit specification, replace the clutch assembly. (Refer to item 1-6-10.)
6. When the clutch gear assembly and the idle lever assembly, perform the reel torque check.

<Precautions for Use of Torque Cassette (KT-300NR)>

1. Before loading a torque cassette in a VCR, always remove tape slack. The tape slack can be removed by rotating the reel in the cassette to its take-up direction. (The tape tends to slack since there is no reel brake on the torque cassette.)
2. Do not perform FF and REW operations by using a torque cassette.
3. When the torque cassette is loaded, confirm following:
   1) Make sure the tape does not ride up or over the No. 8 cap. If it does, do not eject the tape but return the tape to its correct position, taking care not to damage the tape.
   2) Make sure the tape is not slackened. If slackened, operate the VCR in CUE or REVIEW mode and then stop the tape. Then make sure the tape is not slackened again.
   3) After above confirmation, proceed to the real torque adjustment and confirmation.
4. Caution for removal of torque cassette
   1) When removing the torque cassette from the VCR, set the VCR to the STOP mode and wait for several seconds. Then, make sure the tape is not slackened, and push the EJECT button to remove the cassette.
5. If the previous precautions “1.” to “4.” are not performed properly, the tape may be damaged and correct measurements can not be performed.
6. Do not use worn out or damaged tape, if used they may damage video heads on the cylinder. In such a case always replace the tape with a new one. The replacement tape is of T-120, 10 m in length.

1-7-3. Tape Transport System Adjustment

The tape transport system has been precisely adjusted in the factory, so only when some defective phenomenon occurs such as noise observed on the screen and tape damage, or when replacing the portion shown on the adjustment procedures of the tape transport system, adjustment and check are necessary.
Electrical signal output terminal required for adjustment differs depending upon the models. Refer to the test point location in the Electrical Adjustment Section.

(1) Location of Tape Transport Adjustment <Adjustment Reference>

Lower flange height of No.8 guide is used as the basic reference for the transport adjustment. To keep height of the No.8 guide, do not apply excessive force onto the main base to prevent the main base from deformation.

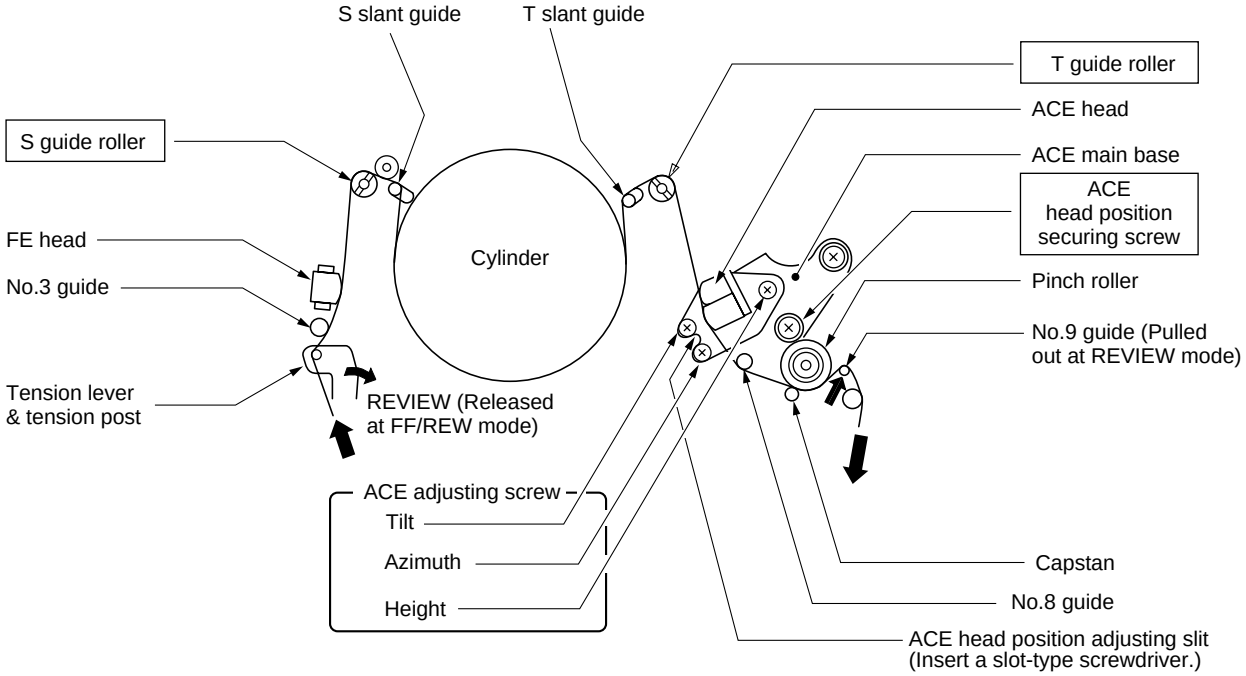


Fig. 1-7-2

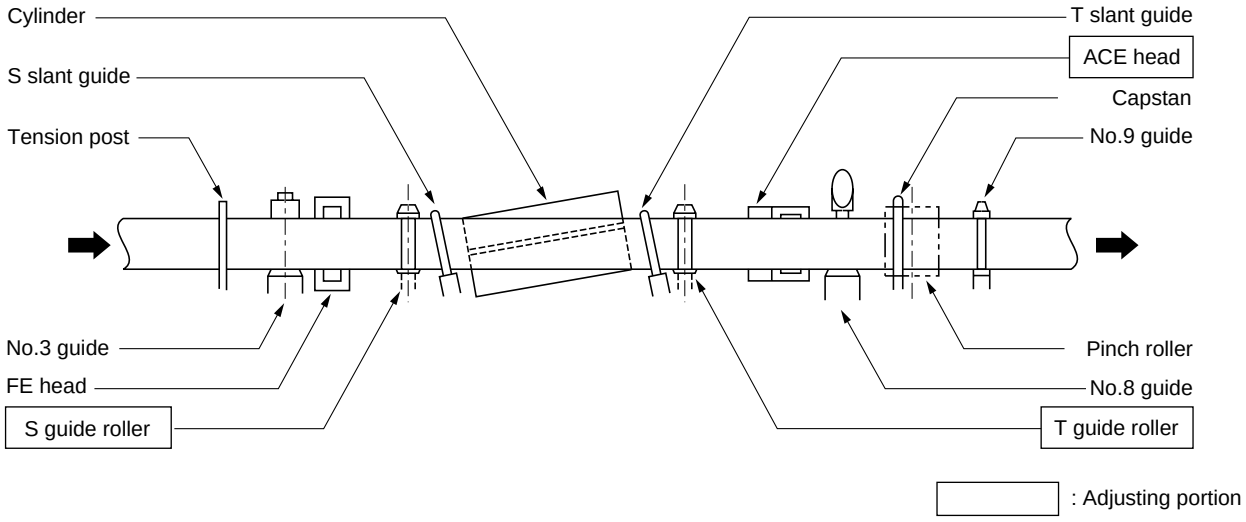


Fig. 1-7-3

(2) Tape Transport System Adjustment Flowchart

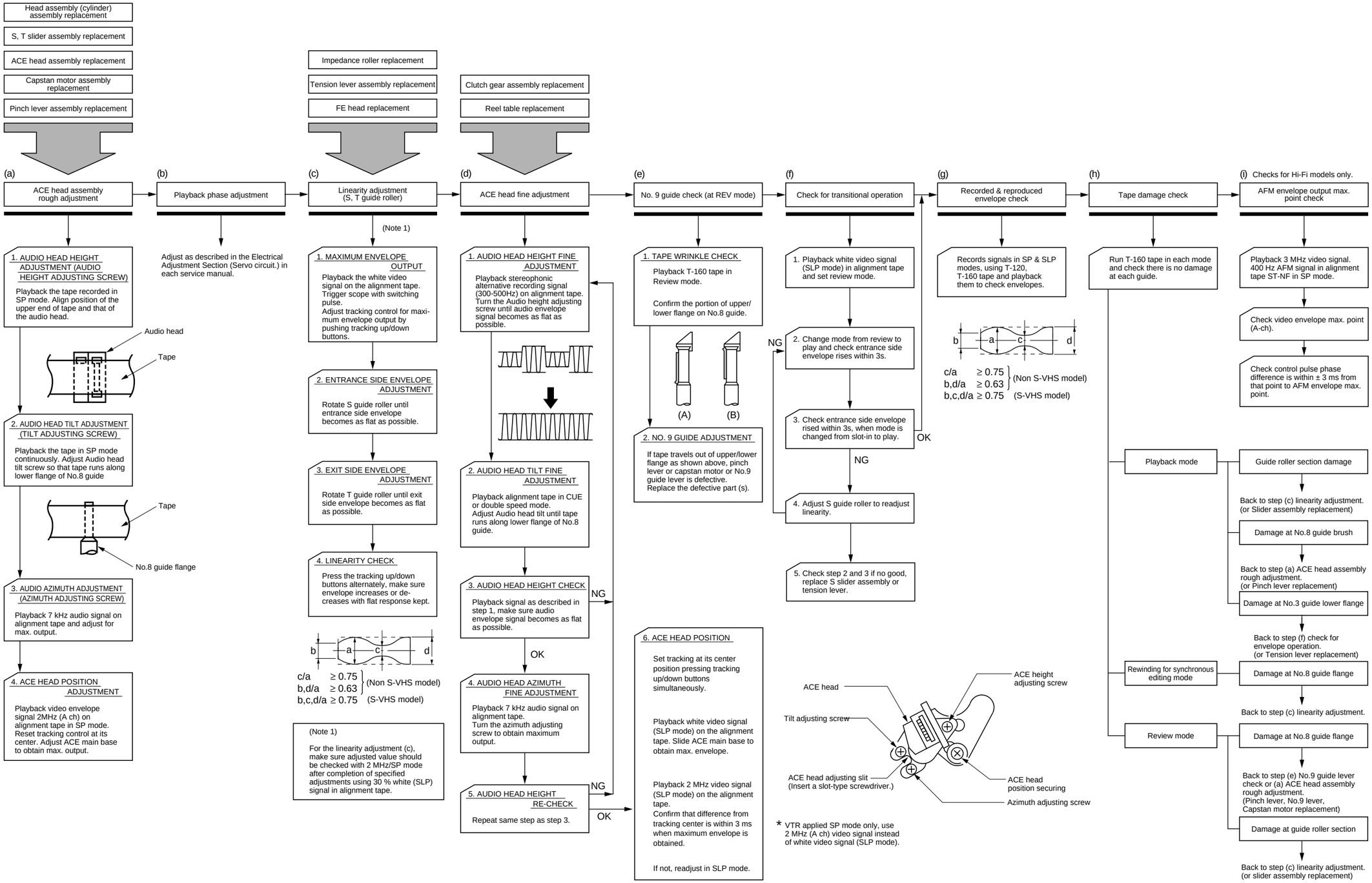

Head assembly (cylinder) assembly replacement
S, T slider assembly replacement
ACE head assembly replacement
Capstan motor assembly replacement
Pinch lever assembly replacement
Impedance roller replacement
Tension lever assembly replacement
FE head replacement
Clutch gear assembly replacement
Reel table replacement
(a)
ACE head assembly rough adjustment
1. AUDIO HEAD HEIGHT ADJUSTMENT (AUDIO HEIGHT ADJUSTING SCREW)
Playback the tape recorded in SP mode. Align position of the upper end of tape and that of the audio head.
Audio head
Tape
2. AUDIO HEAD TILT ADJUSTMENT (TILT ADJUSTING SCREW)
Playback the tape in SP mode continuously. Adjust Audio head tilt screw so that tape runs along lower flange of No.8 guide
Tape
No.8 guide flange
3. AUDIO AZIMUTH ADJUSTMENT (AZIMUTH ADJUSTING SCREW)
Playback 7 kHz audio signal on alignment tape and adjust for max. output.
4. ACE HEAD POSITION ADJUSTMENT
Playback video envelope signal 2MHz (A ch) on alignment tape in SP mode. Reset tracking control at its center. Adjust ACE main base to obtain max. output.
(b)
Playback phase adjustment
Adjust as described in the Electrical Adjustment Section (Servo circuit.) in each service manual.
(c)
Linearity adjustment (S, T guide roller)
(Note 1)
1. MAXIMUM ENVELOPE OUTPUT
Playback the white video signal on the alignment tape. Trigger scope with switching pulse.
Adjust tracking control for maximum envelope output by pushing tracking up/down buttons.
2. ENTRANCE SIDE ENVELOPE ADJUSTMENT
Rotate S guide roller until entrance side envelope becomes as flat as possible.
3. EXIT SIDE ENVELOPE ADJUSTMENT
Rotate T guide roller until exit side envelope becomes as flat as possible.
4. LINEARITY CHECK
Press the tracking up/down buttons alternately, make sure envelope increases or decreases with flat response kept.
b a c d
c/a ≥ 0.75
b,d/a ≥ 0.63 (Non S-VHS model)
b,c,d/a ≥ 0.75 (S-VHS model)
(Note 1)
For the linearity adjustment (c), make sure adjusted value should be checked with 2 MHz/SP mode after completion of specified adjustments using 30 % white (SLP) signal in alignment tape.
(d)
ACE head fine adjustment
1. AUDIO HEAD HEIGHT FINE ADJUSTMENT
Playback stereophonic alternative recording signal (300-500Hz) on alignment tape. Turn the Audio height adjusting screw until audio envelope signal becomes as flat as possible.
2. AUDIO HEAD TILT FINE ADJUSTMENT
Playback alignment tape in CUE or double speed mode.
Adjust Audio head tilt until tape runs along lower flange of No.8 guide.
3. AUDIO HEAD HEIGHT CHECK
Playback signal as described in step 1, make sure audio envelope signal becomes as flat as possible.
NG
OK
4. AUDIO HEAD AZIMUTH FINE ADJUSTMENT
Playback 7 kHz audio signal on alignment tape.
Turn the azimuth adjusting screw to obtain maximum output.
5. AUDIO HEAD HEIGHT RE-CHECK
Repeat same step as step 3.
NG
OK
(e)
No. 9 guide check (at REV mode)
1. TAPE WRINKLE CHECK
Playback T-160 tape in Review mode.
Confirm the portion of upper/lower flange on No.8 guide.
(A)
(B)
2. NO. 9 GUIDE ADJUSTMENT
If tape travels out of upper/lower flange as shown above, pinch lever or capstan motor or No.9 guide lever is defective. Replace the defective part (s).
6. ACE HEAD POSITION
Set tracking at its center position pressing tracking up/down buttons simultaneously.
Playback white video signal (SLP mode) on the alignment tape. Slide ACE main base to obtain max. envelope.
Playback 2 MHz video signal (SLP mode) on the alignment tape.
Confirm that difference from tracking center is within 3 ms when maximum envelope is obtained.
If not, readjust in SLP mode.
(f)
Check for transitional operation
1. Playback white video signal (SLP mode) in alignment tape and set review mode.
2. Change mode from review to play and check entrance side envelope rises within 3s.
NG
3. Check entrance side envelope rised within 3s, when mode is changed from slot-in to play.
OK
NG
4. Adjust S guide roller to readjust linearity.
5. Check step 2 and 3 if no good, replace S slider assembly or tension lever.
ACE head
Tilt adjusting screw
ACE head adjusting slit (Insert a slot-type screwdriver.)
ACE height adjusting screw
ACE head position securing
Azimuth adjusting screw
* VTR applied SP mode only, use 2 MHz (A ch) video signal instead of white video signal (SLP mode).
(g)
Recorded & reproduced envelope check
Records signals in SP & SLP modes, using T-120, T-160 tape and playback them to check envelopes.
b a c d
c/a ≥ 0.75
b,d/a ≥ 0.63 (Non S-VHS model)
b,c,d/a ≥ 0.75 (S-VHS model)
(h)
Tape damage check
Run T-160 tape in each mode and check there is no damage at each guide.
Playback mode
Guide roller section damage
Back to step (c) linearity adjustment. (or Slider assembly replacement)
Damage at No.8 guide brush
Back to step (a) ACE head assembly rough adjustment. (or Pinch lever replacement)
Damage at No.3 guide lower flange
Back to step (f) check for envelope operation. (or Tension lever replacement)
Rewinding for synchronous editing mode
Damage at No.8 guide flange
Back to step (c) linearity adjustment.
Review mode
Damage at No.8 guide flange
Back to step (e) No.9 guide lever check or (a) ACE head assembly rough adjustment. (Pinch lever, No.9 lever, Capstan motor replacement)
Damage at guide roller section
Back to step (c) linearity adjustment. (or slider assembly replacement)
(i) Checks for Hi-Fi models only.
AFM envelope output max. point check
Playback 3 MHz video signal. 400 Hz AFM signal in alignment tape ST-NF in SP mode.
Check video envelope max. point (A-ch).
Check control pulse phase difference is within ± 3 ms from that point to AFM envelope max. point.

Fig. 1-7-4

(3) Tape Transport System Adjustment

<Rough Adjustment>

When the part(s) listed in Table 1-7-1 is replaced, perform required adjustments by referring to procedures for the tape transport system. When the part (s) listed in Table 1-7-1 is replaced, the tape path may be changed and may damage alignment tape. To prevent this, first run a T-160 tape and make sure excessive tape wrinkle does not occur at each tape guide.

1. If tape wrinkle is observed at the S, T guide rollers, turn the S, T guide rollers until wrinkle disappears.
2. If tape wrinkle is observed at the No. 8 guide, perform the tilt adjustment of the ACE head.

Table 1-7-1

Parts replacement	Adjustment procedure
• Head assembly (Cylinder) • S, T sliders assembly • ACE head assembly • Pinch lever assembly • No. 9 guide lever	From item (a)
• Impedance roller • Tension lever • FE head	From item (c)
• Clutch gear assembly • S, T reel tables	From item (d)

<Adjustment Procedures>

1) ACE Head Assembly Rough Adjustment

a. Audio Head Height Adjustment

1. Play back the tape recorded in the SP mode. Observe the core portion of the ACE head.
2. Turn the ACE height adjusting screw so that upper tape edge matches to the upper edge of the audio head core. (Refer to Fig. 1-7-5.)

b. ACE Head Tilt Adjustment

1. Play back the T-160 tape recorded in the SP mode and observe running condition of the tape at the lower flange of No.8 guide.
2. Turn the ACE tilt adjusting screw until tape wrinkle is caused at the lower flange of No. 8 guide as shown in Fig. 1-7-6 (A).
3. Turn the ACE tilt adjusting screw counter-clockwise until the tape travels along the lower flange as shown in Fig. 1-7-6 (B).

c. Audio Head Azimuth Adjustment

1. Play back the 7 kHz audio signal on the alignment tape in the SP mode.
2. Connect a milli-voltmeter or oscilloscope to the audio line output terminal.
3. Turn the ACE azimuth adjusting screw to obtain maximum audio output.

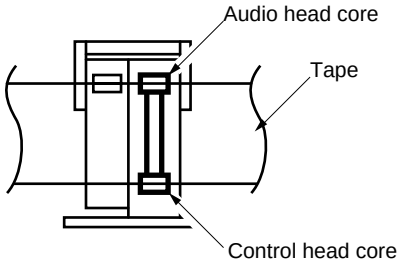


Fig. 1-7-5

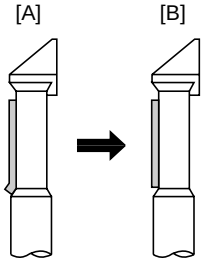


Fig. 1-7-6 No. 8 guide rough adjustment check

d. ACE Head Position Adjustment

1. Play back the 2 MHz video envelope signal in the alignment tape in the SP mode. Loosen the ACE head position securing screw.
2. Insert a slot-type screwdriver into the ACE head position adjusting slit on the ACE main base and adjust the ACE main base so that the video envelope reaches a peak level at the tracking center position.

2) Playback Phase Adjustment

Perform playback phase adjustment according to the methods stated in the Electrical Adjustment (servo system).

3) Linearity Adjustment

1. Play back the SLP mode white video signal on the alignment tape.

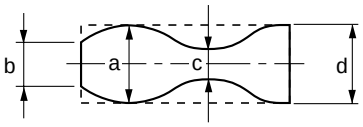
Note:

- For models SP mode only, use the 2 MHz (A ch) video signal in the SP mode and other adjustments are same.

2. Trigger the scope with the switching pulse to issue the envelope signal output.
3. Make sure the video envelope waveform (in its maximum output) meets the specification shown in Fig. 1-7-7. Again make sure the same by playing back the SP mode 2 MHz video signal on the alignment tape. If not satisfied, adjust as follows:

Note:

a : maximum output of the video RF envelope
b : minimum output of the video RF envelope at the entrance side
c : minimum output of the video RF envelope at the center point of cylinder
d : minimum output of the video RF envelop at the exit side of cylinder



c,b,d/a ≥ 0.75 (S-VHS model)
b,d/a ≥ 0.63 } (Non S-VHS model)
c/a ≥ 0.75 }

Fig. 1-7-7

4. If the A section in Fig. 1-7-8 does not meet the specifications, adjust the S guide roller in up or down direction.
5. If the B section in Fig. 1-7-8 does not meet the specifications, adjust T guide roller in up or down direction.

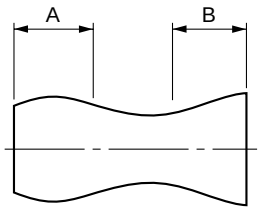


Fig. 1-7-8 Adjusting section

6. After completion of the adjustment(s), push the tracking up/down button and make sure video envelope variations are almost flat.
   Next, playback the 2 MHz (A ch) SP mode video signal on the alignment tape and make sure the video RF envelope variations are also flat when tracking up/down buttons is pushed.
7. If the envelope varies like NG figures as shown in Fig. 1-7-9, perform the adjustment again since it is abnormal.
   Smooth secondary curves are allowable level.

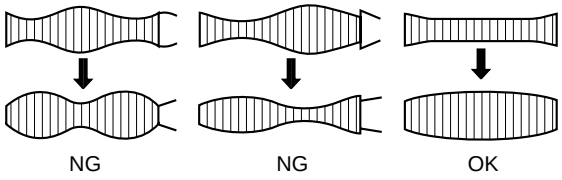


Fig. 1-7-9 Abnormal waveform variation

4) ACE Head Assembly Fine Adjustment

a. Audio Head Height Fine Adjustment

1. Play back the stereophonic alternative recording 300 to 500 Hz audio signal on the alignment tape.
2. Adjust the audio height adjusting screw so that the signal envelope is obtained almost flat.

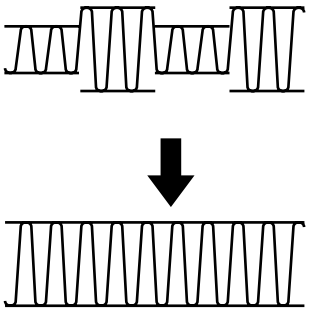


Fig. 1-7-10

Note:

- If there is no alignment tape with audio height adjustment of the stereophonic alternative recording, do not perform this item a. Audio head height fine adjustment, and perform the process of the note in item e. Audio head height re-check described later.

b. ACE Tilt Adjustment

1. Observe the lower flange of No. 8 guide. If any wrinkle is observed, turn the ACE tilt adjusting screw counterclockwise until the wrinkle disappears.
2. If a gap is observed between the lower flange of No. 8 guide and the lower edge of tape, turn the ACE tilt adjusting screw clockwise until the tape travels along

Note:

- This adjustment is performed easily in SP mode playback, double speed playback mode or CUE mode.

c. Audio Head Height Check

Play back the audio signal as described in the step 4) a., and check if the audio envelope is flat. If not, repeat the adjustment described in step 4) a. again.

d. Audio Azimuth Adjustment

1. Play back the 400 Hz in SP mode, 7 kHz audio signal on the alignment tape.
2. Turn the ACE azimuth adjusting screw until the maximum audio output is obtained.

e. Audio Head Height Re-check

1. Play back the audio signal as described in the step 4) a., and check if the audio envelope is flat. If not, repeat the adjustment described in step 1) again.

Note:

- If there is no alignment tape with the stereophonic alternative recording signal, perform the audio height alignment using the current alignment tape at this adjustment step.

2. Playback the 400 Hz audio signal (SP mode) on the alignment tape.
3. Turn each three alignment screw of the ACE head to the same direction in 45 degrees steps evenly so that the audio output level becomes maximum.
4. Perform the confirmation and adjustment for the tilt and the azimuth again.

f. ACE Head Position Adjustment

1. Play back the SLP mode white envelope signal on the alignment tape.
2. Push the tracking up/down buttons simultaneously and reset the tracking at its center position.
3. Trigger the oscilloscope with the video switching pulse and observe the video envelope waveform.
4. Slide the ACE main base until the maximum envelope output is obtained as described in ACE head position rough adjustment.
5. Play back the 2 MHz video signal in SP mode on the alignment tape.
6. Make sure the envelope output is maximum when the tracking control is placed at its center position.
   If no envelope output is obtained with the tracking control set to the center position, again adjust it for maximum envelope output in SP and SLP modes.
   When envelope output is maximum in the SLP mode at the tracking center, difference between the tracking position of maximum envelope in the SP mode and the tracking center is within 3ms.
7. Tighten the ACE head position fixing screw and secure the ACE main base.

g. After Completion of ACE Head Fine Adjustment

Apply screw lock to two screws (tilt, azimuth adjusting screws) in front of the ACE head.

5) No. 9 Guide Lever Check

1. Set the VCR to Cue mode with T-160 tape (at beginning portion) loaded. Switch the Cue mode to the review mode when the tape has been rewound into the T reel table to some extent.
2. Check tape wrinkle at the upper and lower flange of No. 8 guide. Check the tape does not come off from the flange while running. If the tape comes off from the flange, replace the pinch lever, capstan motor or No. 9 guide lever since the part(s) is (are) defective.

Note:

- Modify the lid of the cassette for the alignment tape T-160 previously so that the alignment is performed easily.

6) Check for Transitional Operation of Envelope

1. Play back the SLP mode white video signal on the alignment tape, and set in Review mode, and then observe the video envelope with the oscilloscope.
2. Switch the Review mode to the Play mode. When switched to the Play mode, make sure the entrance side envelope comes to an approximate steady state within 3s as shown in Fig. 1-7-11.
   If it does not rise within 3s, take the following steps starting 4.
3. Switch the cassette slot-in mode to the Play mode. As in item 2., if it does not rise within 3s, adjust as follows.

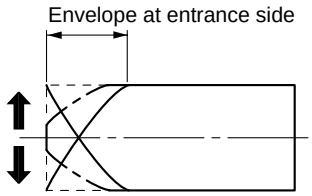


Fig. 1-7-11 Video envelope rising when operation mode is switched from review to play mode

4. Adjust the S guide roller and perform the linearity adjustment again.
5. Check above items 2. and 3. to see that the video envelope rises within 3s. If not, S slider assembly or the tension lever is damaged. Replace either (or both) of them.

Note:

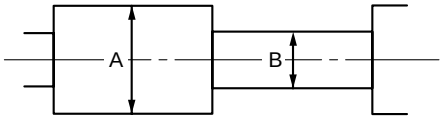
- If the rising characteristic is poor in Review mode, screen noise may occur in synchronous editing recording. Perform the adjustment carefully.

7) Envelope Check

1. Make recordings and playback the tapes T-120 and T-160 in SP and SLP modes and make sure the playback output envelope meets the specifications shown in Fig. 1-7-7.
2. In recording/playback the tape with a T-120, the video envelope should meet the specification as shown in Fig. 1-7-12.

Note:

- Check for both modes, SP and SLP. Also check for AFM envelope when using a Hi-Fi model.



B/A ≥ 0.55

B ≥ 120mV

Fig. 1-7-12 Envelope output and output difference

3. If the performance does not meet both specifications above 1. and 2. above, replace the head assembly (cylinder) assembly.
4. Set the VCR to Rec mode (SLP) with the T-120 tape loaded (at the beginning part) and check operation of the synchronous editing recording.
5. If picture noises are observed at the starting position of the editing, check for transitional operation (f).

8) Tape Damage Check

1. Playback the T-160 tape in the Play mode, CUE mode, Review mode and the frame advance mode, and check each guide for wrinkle.
2. If excessive tape wrinkle is observed at the mode shown below, perform the associated adjustments in each mode. Also the parts described in ( ) may need to replace.
   a. Playback mode
      Tape damage at the S, T-guide rollers section
      (c) Linearity adjustment (Slider assembly)

      Tape damage at No. 8 guide flange
      (a) ACE head assembly rough adjustment (Pinch assembly)

      Tape damage at lower flange of No. 3 guide
      (f) Check for transitional operations from Review to Play, and Slot-In to Play (Tension lever)

   b. Review mode
      Tape damage at No. 8 guide
      (a) ACE head assembly rough adjustment (Pinch assembly, No. 9 guide lever, capstan motor assembly)

      Tape damage at the guide rollers
      Guide roller adjustment (or Slider assembly replacement)

   c. Frame advance mode
      Tape wrinkle at No. 8 guide
      (c) Linearity adjustment (Pinch assembly, capstan motor assembly)

9) Maximum AFM Envelope Output Point Check (Hi-Fi Model)

1. Playback the SP mode 3 MHz video signal and the 400 Hz AFM signal on the alignment tape.
2. Trigger the oscilloscope with the video switching pulse, adjust the tracking control and check the control pulse phase at the maximum video envelope (A ch) output point.
3. Make sure the control pulse phase difference among each maximum point of AFM envelope, A ch and B ch is within ± 3 ms with the above point used as the basic reference.

Note:

- If the phase difference exceeds 3 ms, replace the head assembly (cylinder).

1-8. Self-Check Function

1-8-1. Outline

When a tape running stops or the VCR enters the power OFF mode, etc. due to some abnormality, the abnormality is stored in the EEPROM and displayed on the display tube.

1-8-2. Storing Abnormal Modes

1. The abnormality is classed into 5 groups, and the abnormality number, system control mode, and the mechanism position at which the abnormality occurred are stored in the EEPROM.
2. The writing timing is just after the abnormality occurred.

1-8-3. Abnormality Mode Display

1. Press the CH UP and CH DOWN buttons on the VCR simultaneously for more than 5s.
2. And then within 2s, press the PAUSE button on the remote control.
3. The system control mode at which the abnormality occurred is displayed at the channel display area, "F" is displayed at the hour digit, abnormality generation number is displayed at the minute digit, and the mechanism position is displayed in the second digit position.
4. The abnormality mode display is not indicated in the mode with the display tube turned off, such as saving mode, etc. In this case, after confirming the abnormality status, turn the power on and display the abnormality mode.

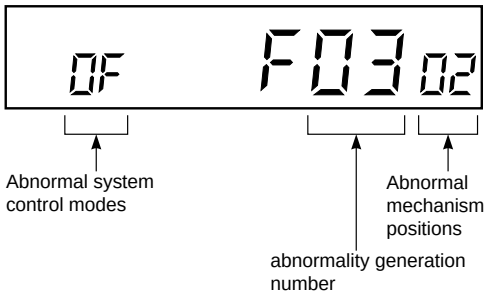


Fig. 1-8-1

5. When the Counter Reset button is pressed in the display period, the abnormality display data is initialized and "–" is displayed.

The data displayed are as follows:

Table 1-8-1 Abnormality generation number

01	Cylinder stop
02	Reel abnormality (take up)
03	Reel abnormality (supply)
04	Abnormal slot in/slot out
05	Abnormal loading

Table 1-8-2 Abnormal system control modes

00	Standby
01	Stop
02	Rewind
03	Review
04	FF
05	Cue
06	Playback
07	Still, slow playback
08	X2 speed
09	Unloading stop
0A	Reverse playback
0b	Still in reverse playback, Reverse slow playback
0C	Recording
0d	Record pause
0E	Power off eject
0F	Eject
10	Short FF
11	Short REW

Table 1-8-3 Abnormal mechanism positions

00	F/L driving
02	Loading/unloading
04	Reverse rotation with pinch roller ON
06	Playback with pinch roller ON
08	Stop with main brake ON
0A, 0C	FF/REW
0F	Position detection impossible

Positions 01, 03, 05, 07, 09 and 0B exist as mechanism positions.
For example, 05 shows a position between 04 and 06 (between playback position and review position).

1-8-4. Cylinder Rotation Time Display

(1) Outline

All the time for which the cylinder is ON is counted, memorized on EEPROM, and indicated on the display tube.

(2) Display Method

1. Press the "CH UP" and "CH DOWN" button on the main unit for more 5 s at the same time.
2. Next, within 2 s press the "STOP" button on the remote control.
3. The cumulative operation time of the cylinder will be displayed for 30 s. The time unit is an hour.

(3) Example of Display

1. In case of 1234 hours.

Fig. 1-8-2

2. In case of 4 hours.

Fig. 1-8-3

2. ELECTRICAL ADJUSTMENT

< Test equipment required >

Adjustment will be performed with the following test equipment.

1. Color TV (Monitor)
2. Oscilloscope, 2 CHs, 15 MHz or higher with delay system
3. Frequency counter (7 digits or higher)
4. Millivoltmeter
5. Digital voltmeter
6. Tester (20 kΩ/V)
7. Audio generator
8. Audio attenuator
9. Alignment tapes
   Part code: ST-N1: 70909202
   ST-NF: 70909203
   ST-N5: 70909401
10. Alignment screw driver (jig)
11. Color pattern generator
12. Video sweep generator

< Color bar signal >

Color bar signals of 75% recorded on the alignment tapes are shown in Fig. 2-1.

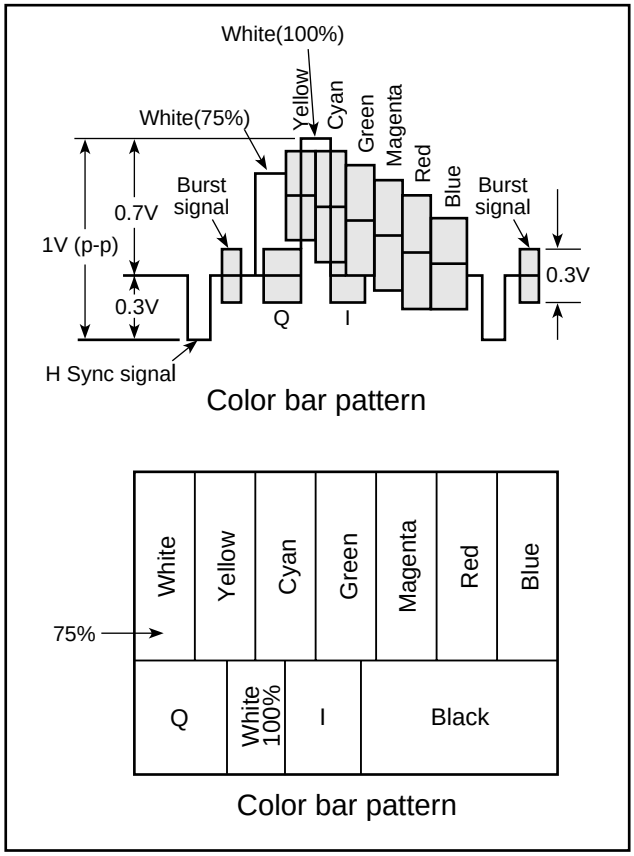


Fig. 2-1

< Specified input output levels, and impedance >

Video input: Negative sync, standard composite video signal 1 V(p-p), 75 Ω
Video output: Same as the video input, 1 V(p-p), 75 Ω
Audio input: 308mV(rms), more than 47 kΩ
Audio output: 308mV(rms), less than 4.7 kΩ

< Alignment sequence >

Proceed the alignments in the sequence as shown in Fig. 2-2.

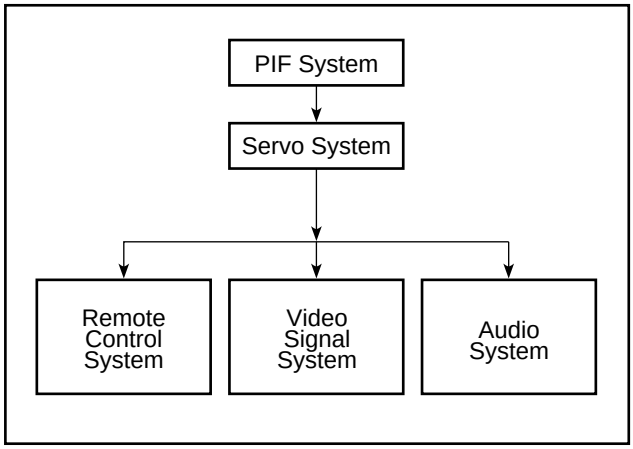
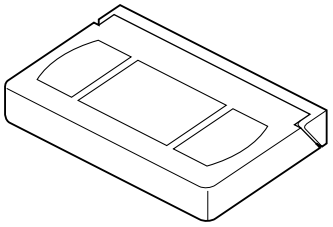


Fig. 2-2

Alignment tape specifications



(1) ST-N1

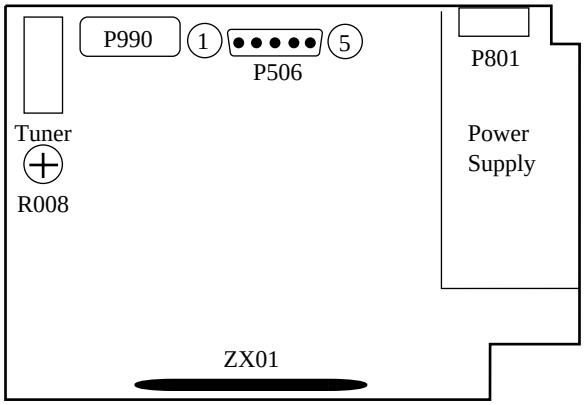
Item / No.	Video signal	Audio signal	Contents	Record	
				Mode	Time
1-1	Color bar	1 kHz	*Check and adjustment of Servo circuit. *Check and adjustment of Video circuit. *Check and adjustment of Audio circuit.	SP	10 min
1-2	Mono Scope	3 kHz	*Check and adjustment of Servo circuit.	SP	10 min
1-3	2 MHz (recorded on CH-A only)	Record each 400 Hz & 7 kHz for 1min 30 s in 3 cycles.	**Notes:** 1. This signal is used for tape running adjustment. 2. Set tracking control to center position except linearity adjustment. 3. When making linearity adjustment (S, T-guide roller), set tracking control to the position where envelope obtains max.	SP	9 min
1-4	Color bar	3 kHz	*Check and adjustment of Servo circuit. *Check and adjustment of Video circuit.	EP (SLP)	5 min
1-5	30% White	No signal	*Check and adjustment of Servo circuit. **Notes :**1. This signal is used for tape running adjustment also. 2. Set tracking control to center. When making linearity adjustment, set tracking control to the position where envelope obtains max..	EP (SLP)	5 min

(2) ST-NF (Hi-Fi Audio (AFM) adjustment)

Item / No.	Video signal	Hi-Fi audio signal (recorded on video track)	Contents	Record	
				Mode	Time
2-1	3 MHz (recorded on CH-A only)	AFM 400 Hz	**Notes :** This signal is used for tape running adjustment. Set tracking control to center position.	SP	5 min
2-2	Color bar	AFM 400 Hz	*Check and adjustment of Hi-Fi Audio circuit. (Set tracking control to the position when Audio FM output level obtains max.) **Notes :** This signal is used for tape running adjustment also. Set tracking control to center position.	SP	5 min
2-3	Color bar	Carrier 1.3 MHz (L ch) 1.7 MHz (R ch)		SP	5 min

(3) ST-N5

Item / No.	Video signal	Audio signal	Contents	Record	
				Mode	Time
3-1	Color bar	1 kHz	*Check and adjustment of Servo circuit. *Check and adjustment of Video circuit. *Check and adjustment of Audio circuit.	SP	10 min
3-2	Mono Scope	3 kHz	*Check and adjustment of Servo circuit.	SP	10 min
3-3	2 MHz (recorded on CH-A only)	Record each 400 Hz & 7 kHz for 1min 30 s in 3 cycles.	**Notes :** 1. This signal is used for tape running adjustment. 2. Set tracking control to center position except linearity adjustment. 3. When making linearity adjustment (S, T-guide roller), set tracking control to the position where envelope obtains max.	SP	9 min
3-4	30% White (recorded on CH-A only)	300 Hz (Stereo L/R Cyclic record)	*Check and adjustment of Servo circuit. **Notes :** 1. This signal is used for tape running adjustment also. 2. Set tracking control to center. When making linearity adjustment, set tracking control to the position where envelope obtains max.	EP (SLP)	10 min
3-5	Color bar	3 kHz	*Check and adjustment of Servo circuit. *Check and adjustment of Video circuit.	EP (SLP)	5 min



Main Board

2-1. PIF Circuit

2-1-1. In Case of IC01 is Replaced

When IC01 (µPC1852) is replaced, the EEPROM data in the VCR is required to memorize a new set of default values as initial alignment. So perform the following procedures:

1. Press the channel up/down buttons on the VCR simultaneously for more than five seconds while the unit is in the power on mode.
2. And then within two seconds, press the number 9 button on the remote control unit.
3. The following data will be set in the corresponding address as tabulated:

Address	Data
14	56
15	19
16	20
17	16
18	12
19	1d

4. Press power button to set the unit to power off mode.
5. Pull out the power cord plug from the AC outlet once and insert the power cord plug into the AC outlet again.
6. The initialization of default data for MTS IC is now completed.

The above-mentioned procedure will only change the software settings of the MTS.
If the channel separation test still fails, proceed to do step 7.

7. • Delete Jumper JP001.
   • Add R008 (variable resistor 20 kΩ).
   • Add R009 (resistor 10 kΩ).
   • Change RD02 to resistor 11 kΩ.
   • Change RD03 to 0 ohm maxi.
   • Tune R008 to achieve the best possible channel separation.

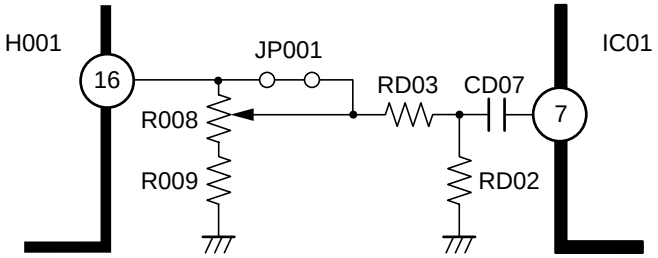


Fig. 2-1-1

2-2. Servo Circuit

2-2-1. Playback Phase (PG) Adjustment

Test point : P506, P990 (Video Out)
Test equipment : Oscilloscope

1. Playback the alignment tape, press <CH UP> and <CH DOWN> keys simultaneously to reset to tracking center.
2. Confirm that phase difference between the rising edge of DFF 3 pin of P506 and the rise of the CTL pulse 2 pin of P506 is 25.36 ms.
3. Press STOP key.
4. Press <CH UP> and <CH DOWN> keys simultaneously on the KDB for at least 5s.
5. Within 2s, press PLAY key on remote control.
6. The display will light up all segments and blink for 10s. Check the luminance which should be consistent for each grid.
7. During the display blinking, the PG auto head adjustment is in progress.
   1) If the adjustment is successful, it will go to STILL for 1.2s, and go to PLAY.
   2) If the adjustment fails, it goes into the STOP mode.
8. Confirm that the play indicator is displayed, and confirm that the falling edge of the DFF pulse is 6.5 H ± 0.5 H (413 µs ± 32 µs) from the V-sync front edge of the video out signal.

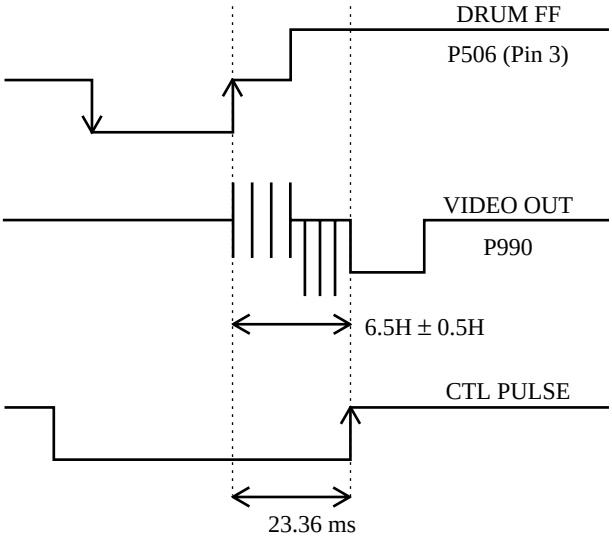


Fig. 2-2-1

2-2-2. Pseudo-V

Test point : Tracking UP-DOWN key
Test equipment : TV monitor

1. Self-recorded tape in SP mode is played and enter STILL mode.
2. When tracking UP-DOWN key is pressed, the center of STILL picture should be adjusted with STILL condition.
   Turn off the VCR. When turning off the VCR, pseudo-V data will be written into EEPROM.

Note :

Do not pull out the POWER CORD, the data will be lost.

2-2-3. SLOW Tracking

Test point : Tracking UP-DOWN key
Test equipment : TV monitor

1. Self-recorded tape in SP mode is played and enter SLOW mode.
2. When tracking UP-DOWN key is pressed, the SLOW picture should be adjusted until all the noise disappear.
3. Repeat step 1 and 2 for SLP self-recorded tape.
4. Turn off the VCR. When turning off the VCR, pseudo-V data will be written into EEPROM.

Note :

Do not pull out the POWER CORD, the data will be lost.

2-2-4 When IC504 is Replaced

When IC504 is replaced, the data in the VCR is required to memorize in the new one. So perform the following procedures.
VCR Status : STOP, EJECT

1. Hold VCR Key Channel Up/Down for 5s during Power off mode without clock set.
2. And then within 2s, by sending remote control number key will set the version data as mention below,
   Key “7” – address 12 H = bAH.

SECTION 3
SERVICING DIAGRAMS

1. INSPECTION PROCEDURES
2. REMOVAL OF THE CABINET
3. LOCATION OF ELECTRICAL UNITS
4. PC BOARD SERVICING PROCEDURE
5. PART CONFIGURATION AND THEIR SYMBOLS
5-1. Precautions For Part Replacent
5-2. Solid Resistor Indication
5-3. Capacitance Indication
5-4. Inductor Indication
5-5. Waveform and Voltage Measurement
6. PRINTED WIRING BOARD AND SCHEMATIC DIAGRAM
7. BLOCK DIAGRAMS
7-1. Power Supply Block Diagram
7-2. PIF Block Diagram
7-3. KDB Display Block Diagram
7-4. EDS Block Diagram
7-5. Servo/Logic Block Diagram
7-6. Video and Conventional Audio Block Diagram
7-7. Hi-Fi Audio Block Diagram
8. CIRCUIT DIAGRAM
8-1. Waveform
8-2. Circuit Diagram
9. PC BOARDS
9-1. Main PC Board (UZ01)
9-2. FCB PC Board (UK02)
9-3. JSB PC Board (UK03)

1. INSPECTION PROCEDURES

Operation steps		Items to be confirmed	Inspection block	Fig No.	
				Block Diagram	Circuit Diagram
1.AC Plug-in	Clock setting	Clock display Clock setting operation	Power (AC system) KDB	7-1-1 7-3-1	8-2-1 8-2-1
2.Power SW ON	Timer/counter, SP/SLP, TV/VCR, SW, Channel selection, EE picture and tone quality, TV/VCR switch (in TV)	Mode display lamp TV receive condition Channel select operation, EE picture and tone quality, Signal level, Stereo operation	Power Logic PIF Video (EE, Rec mode) Audio (EE, Rec mode)	7-1-1 7-5-1 7-2-1 7-6-1 7-7-1	8-2-1 8-2-1 8-2-1 8-2-1 8-2-1
3.Cassette-in and Cassette-out	Cassette-in-Cassette loading Eject Cassette-out	Cassette loading operation Eject operation Indicator lamp Abnormal sound	Logic	7-5-1	8-2-1
4.Key entry operation (Remote control)	REC, PLAY Cue/Review Still, Frame feeding/slow FF/REW	Each mode operation (Tape drive operation) Abnormal sound	Logic	7-5-1	8-2-1
5.Special Functions					
Auto Power ON	Cassette-in at Power OFF	Power ON, Cassette down	Power	7-1-1	8-2-1
Auto Play.	Loading of tape with safety tab	Auto Play — Completion — REW — Completion —	Logic	7-5-1	8-2-1
Auto Rewind	REC/PLAY/CUE	Rewind automatically			
INDEX	Registering Index Signal	Index Search	Servo system	7-5-1	8-2-1
Tape Remain Indicator	" REMAIN/COUNTER "	Tape Remain indicator operation, quick remain operation	Logic	7-5-1	8-2-1
Tracking	Digital tracking	ON/OFF switching	Servo	7-5-1	8-2-1
Auto Speed Select	Timer setting	Changing the tape speed from SP mode to SLP mode	Logic	7-5-1	8-2-1
6.Playback Function Picture Sharpness Tone Quality Others	PLAY (Test tape : ST-N1/ST-NF) Cue/Review Still/Slow	Resolution, S/N, Hue, Saturation, Color unevenness, Color dropout, Sound distortion, Level variation, Picture noise, Jitter, Picture swing, Skew distortion, Flicker, Beat	Video PLAY system Audio PLAY system Servo system	7-6-1 7-7-1 7-5-1	8-2-1 8-2-1 8-2-1
7.REC/PLAY Function Picture Sharpness Tone Quality Others	REC/PLAY	Resolution, S/N, Hue, Saturation, Color unevenness, Color dropout, Sound distortion, Level variation, Picture noise, Jitter, Picture swing Skew distortion, Flicker, Beat	Video PLAY system Audio PLAY system Servo system	7-6-1 7-7-1 7-5-1	8-2-1 8-2-1 8-2-1

How to use the table

1. When inspecting a defective VCR, proceed according to the steps showin in the table.
2. Check the items to be confirmed for each operation step.
3. If a problem is found on the item, check waveforms (level) referring to the block diagram relating to the items.
4. Use PC board pattern diagram and schematic diagram to examine the circuit precisely.
5. After completion of the repair work, check steps 1 – 7 again.

Table 1-1

2. REMOVAL OF THE CABINET

(1) Unplug the power supply plug (1) from the outlet.

(2) Remove the three screws (3) securing the Top cover (2).

(3) Pull the Top cover (2) backwards for removing.

(4) Disconnect the two FFC (4) flexible flat cables.

(5) Release the four claws (A) of the front panel (5) and detach the front panel (5).

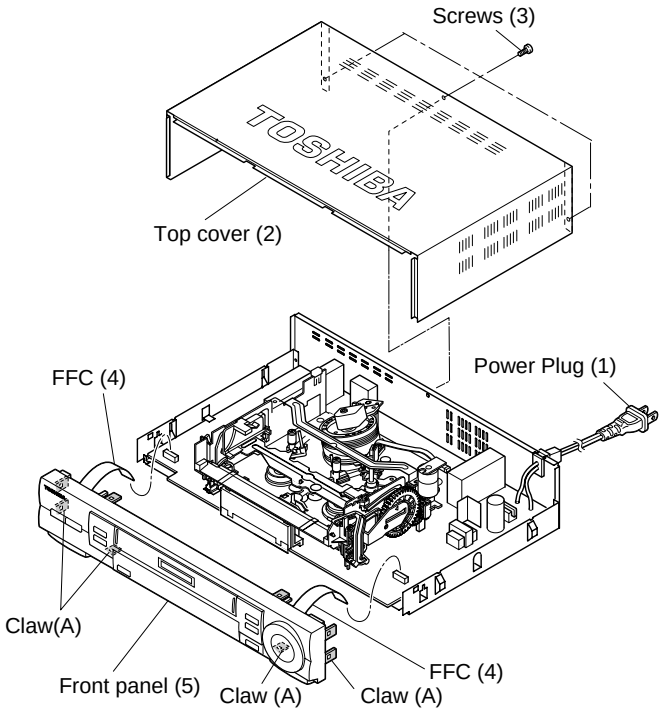


Fig. 2-1

3. LOCATION OF ELECTRICAL UNITS

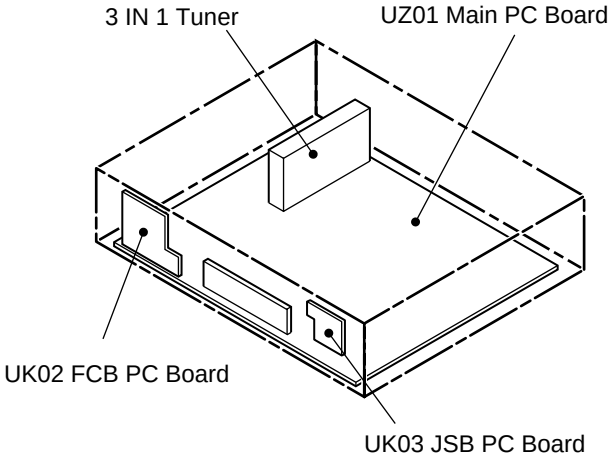


Fig. 3-1

4. PC BOARD SERVICING PROCEDURE

When performing service, connect each connection part of the mechanical deck with the main PC board (two connectors, two flexible flat cables), and then turn the unit upside down with the mechanical deck integrated with the main PC board.

Note:

- When unloading a tape due to power off and ejection, place the unit back to the normal position (from the reversed position) to protect the tape before performing unloading.

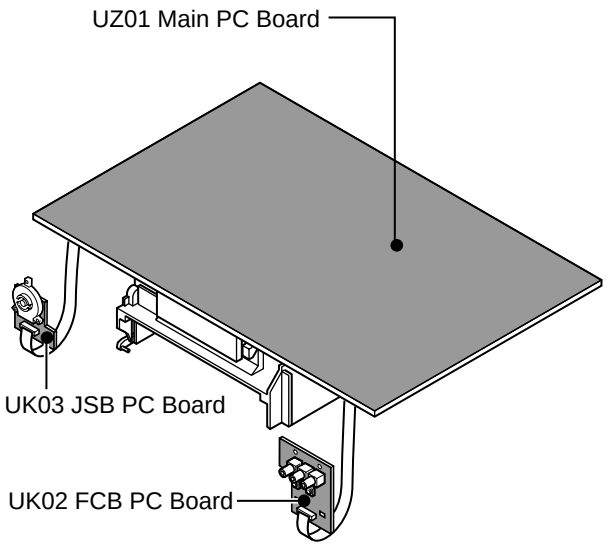


Fig. 4-1

5. PART CONFIGURATION AND THEIR SYMBOLS

5-1. Precautions For Part Replacement

* In the schematic diagram, parts marked ⚠ (ex. ⚠ F801) are critical part to meet the safety regulations, so always use the parts bearing specified part codes (SN) when replacing them.
* Using the parts other than those specified shall violate the regulations, and may cause troubles such as operation failures, fire, etc.

5-2. Solid Resistor Indication

Unit	None • • • Ω k • • • kΩ M • • • MΩ
Tolerance	None • • • ± 5 % B • • • ± 0.1 % C • • • ± 0.25 % D • • • ± 0.5 % F • • • ± 1 % G • • • ± 2 % K • • • ± 10 % M • • • ± 20 %
Rated Wattage	(1) Chip Parts None • • • 1/16 W (2) Other Parts None • • • 1/6 W Other than above, described in the Circuit Diagram
Type	None • • • Carbon film S • • • Solid R • • • Oxide metal film W • • • Metal film W • • • Cement RF • • • Fusible

Table 5-2-1

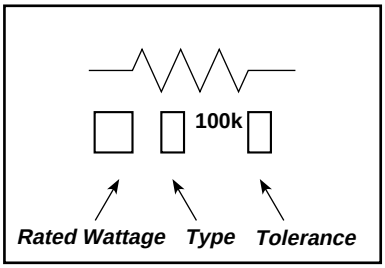


Fig. 5-2-1

5-3. Capacitance Indication

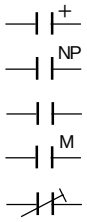
Symbol	 • • • Electrolytic, Special electrolytic • • • Non polarity electrolytic • • • Ceramic, plastic • • • Film • • • Trimmer
Unit	None • • • F m • • • μF p • • • pF
Rated voltage	None • • • 50 V For other than 50 V and electrolytic capacitors, described in the Circuit Diagram.
Tolerance	(1) Ceramic, plastic, and film capacitors of which capacitance are more than 10 pF. None • • • ± 5 % or more B • • • ± 0.1 % C • • • ± 0.25 % D • • • ± 0.5 % F • • • ± 1 % G • • • ± 2 % (2) Ceramic, plastic, and film capacitors of which capacitance are 10 pF or less. None • • • more than ± 5 pF B • • • ± 0.1 pF C • • • ± 0.25 pF (3) Electrolytic,Trimmer Tolerance is not described.
Temperature characteristic (Ceramic capacitor)	None • • • SL For others, temperature characteristics are described. (For capacitors of 0.01 μF and no indications are described as F.)

Table 5-3-1

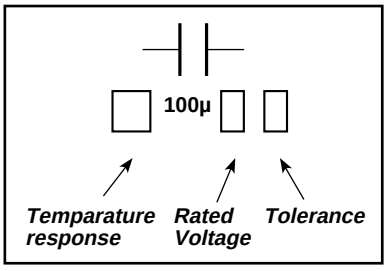


Fig. 5-3-1

5-4. Inductor Indication

Unit	None • • • H μ • • • μH m • • • mH
Tolerance	None • • • ± 5 % B • • • ± 0.1 % C • • • ± 0.25 % D • • • ± 0.5 % F • • • ± 1 % G • • • ± 2 % K • • • ± 10 % M • • • ± 20 %
Type	PL • • • Peaking For others, model name is described.

Table 5-4-1

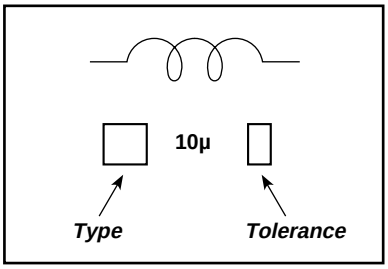


Fig. 5-4-1

5-5. Waveform and Voltage Measurement

* Measurement of waveform and voltage at each section in the color circuits was conducted with sufficient service color bar signal being received and reproduced in normal conditions.
* Waveforms and voltage values for the remaining circuit were measured with a broadcasting signal normally received, so they may vary slightly according to the programs being received. Use them as a measure for servicing.
* All voltage values except the waveforms are expressed in DC and measured by a digital voltmeter.

6. PRINTED WIRING BOARD AND SCHEMATIC DIAGRAM

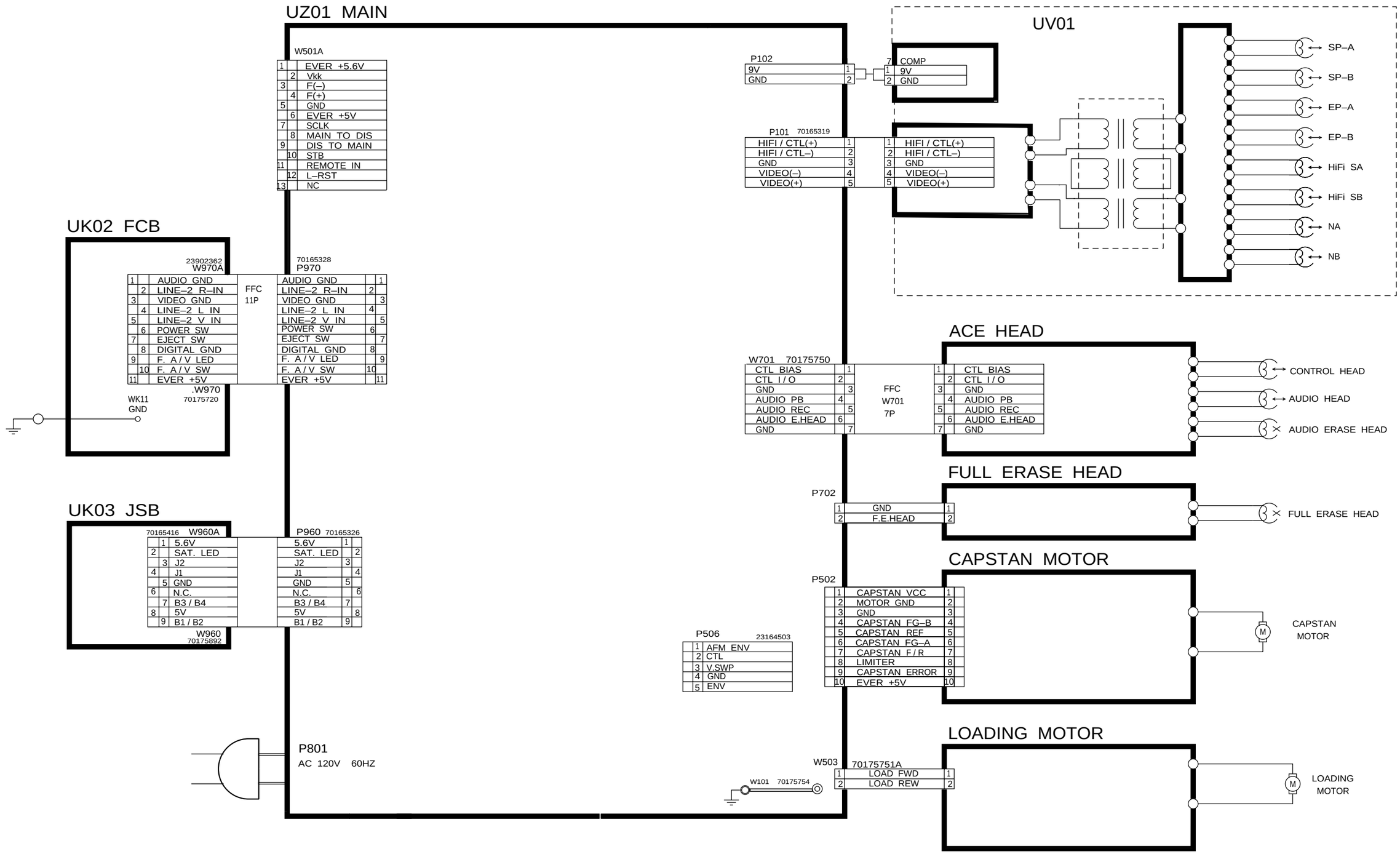


Fig. 6-1

7. BLOCK DIAGRAMS

7-1. Power Supply Block Diagram

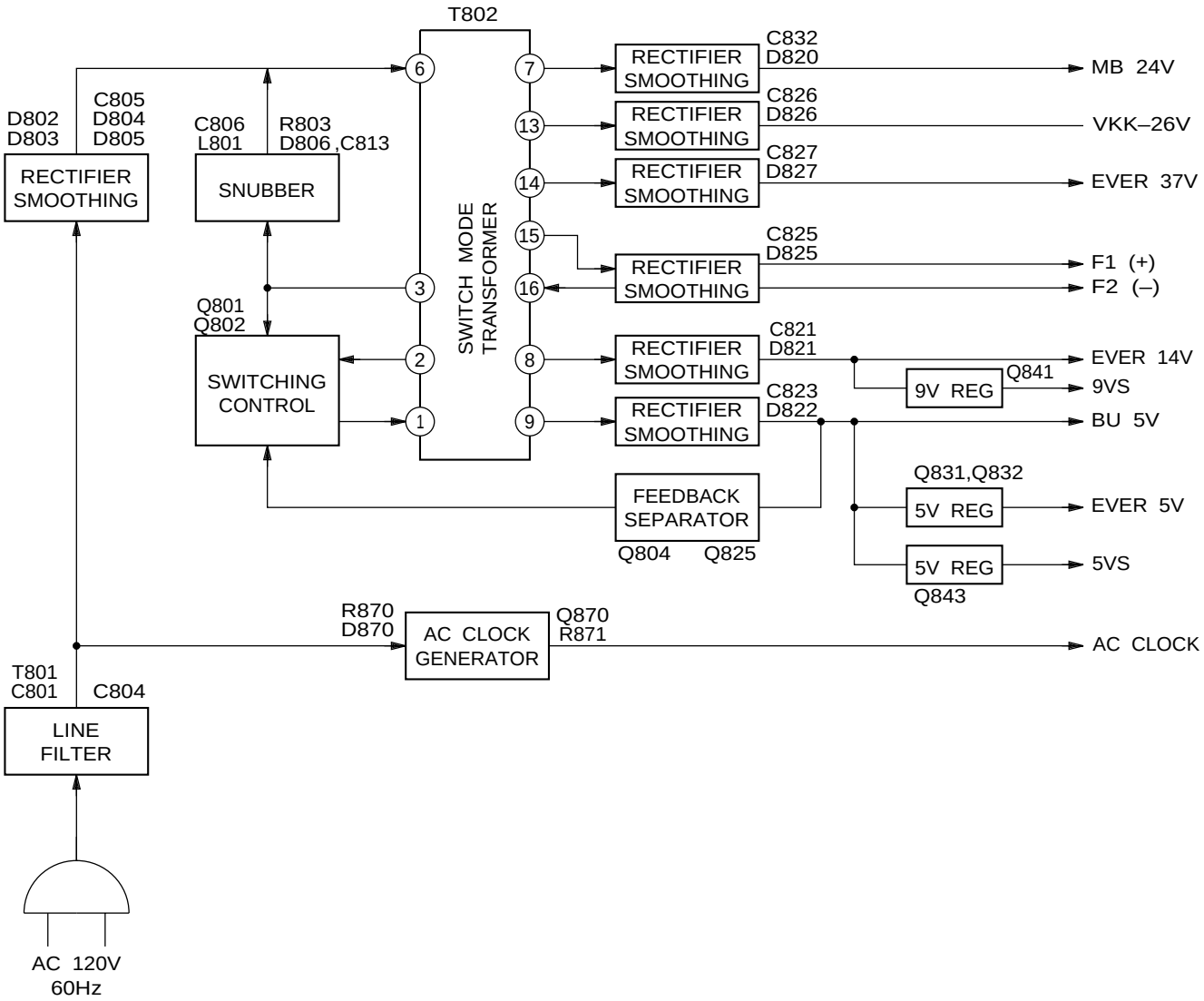


Fig. 7-1-1

7-2. PIF Block Diagram

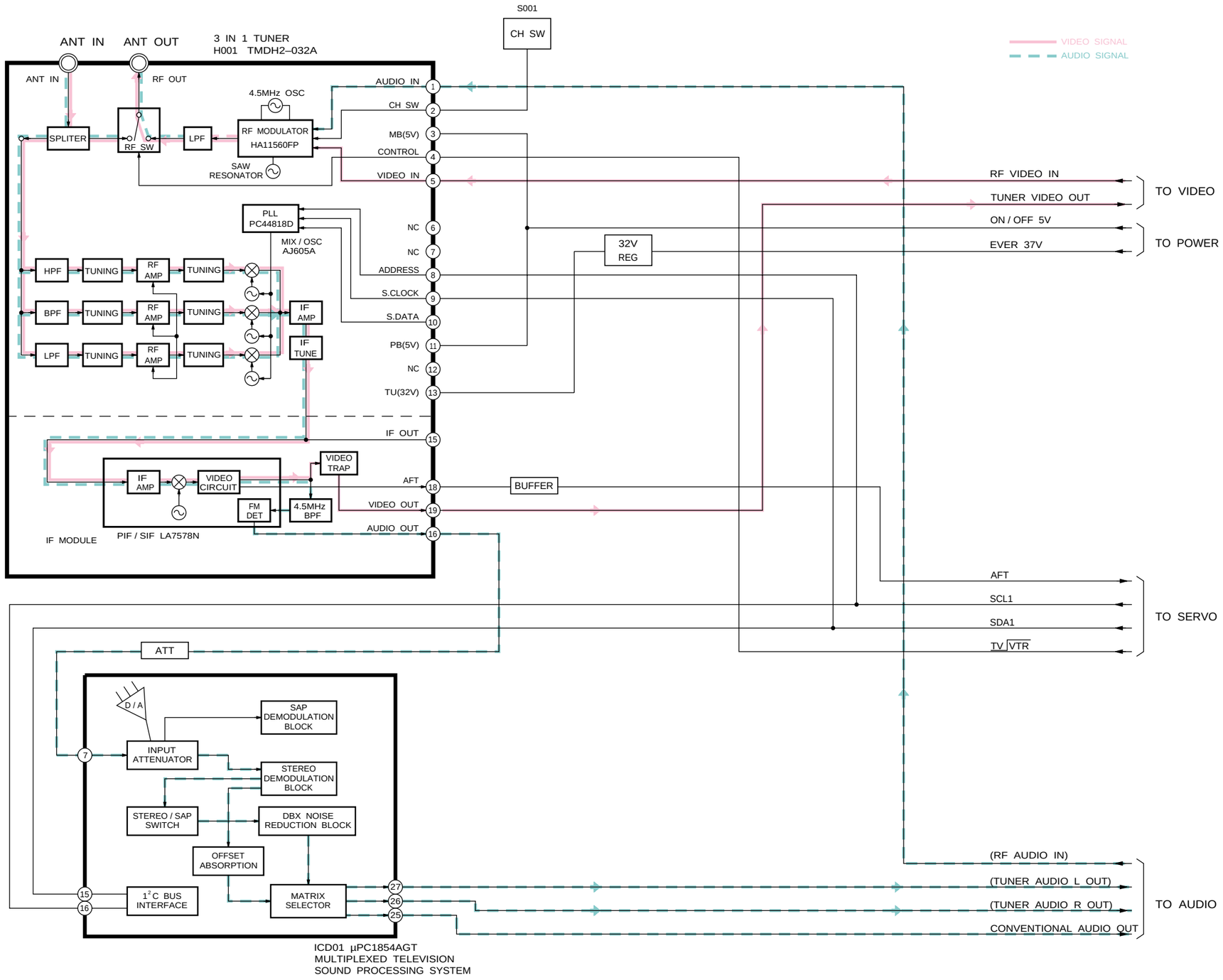


Fig. 7-2-1

7-3. KDB Display Block Diagram

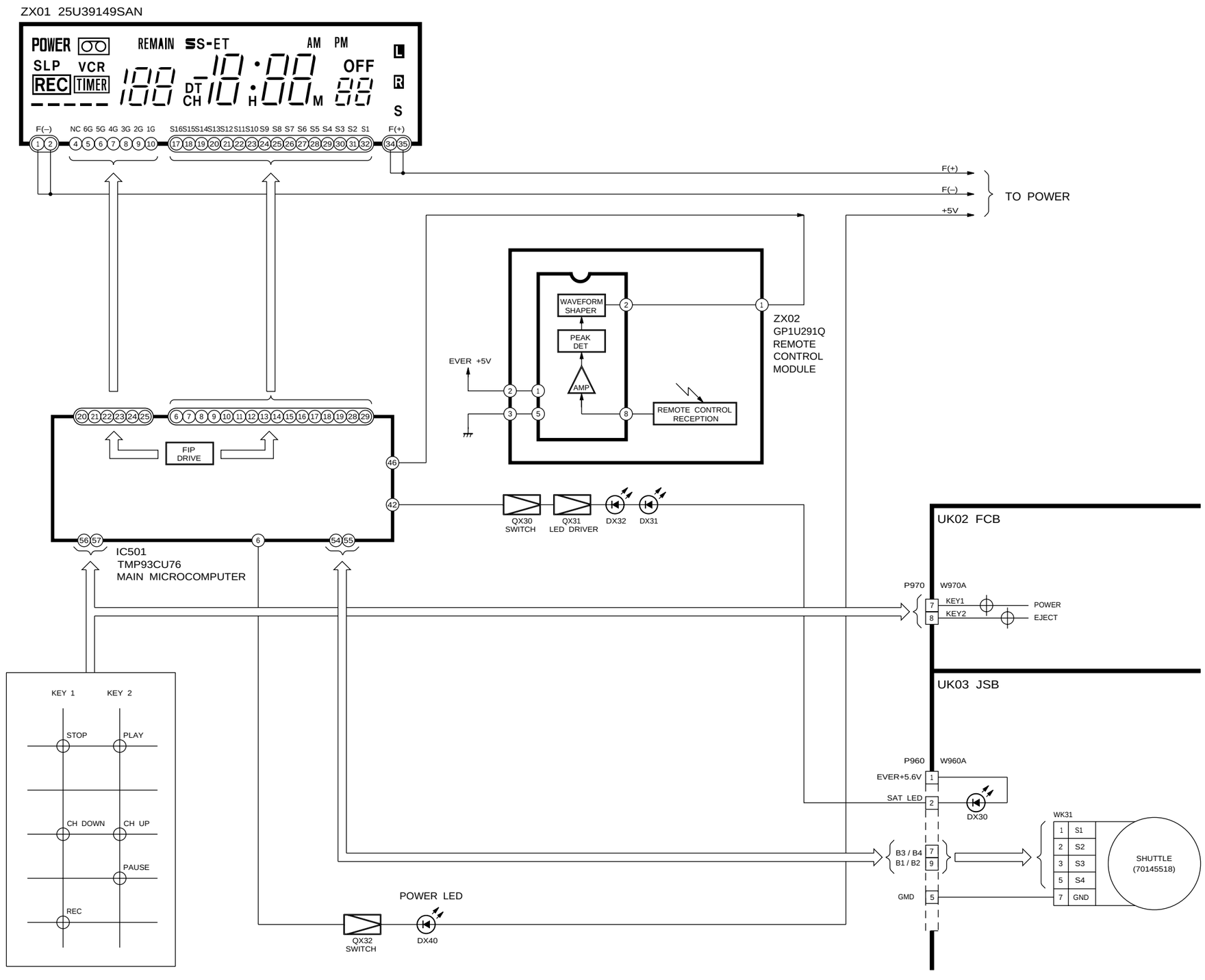


Fig. 7-3-1

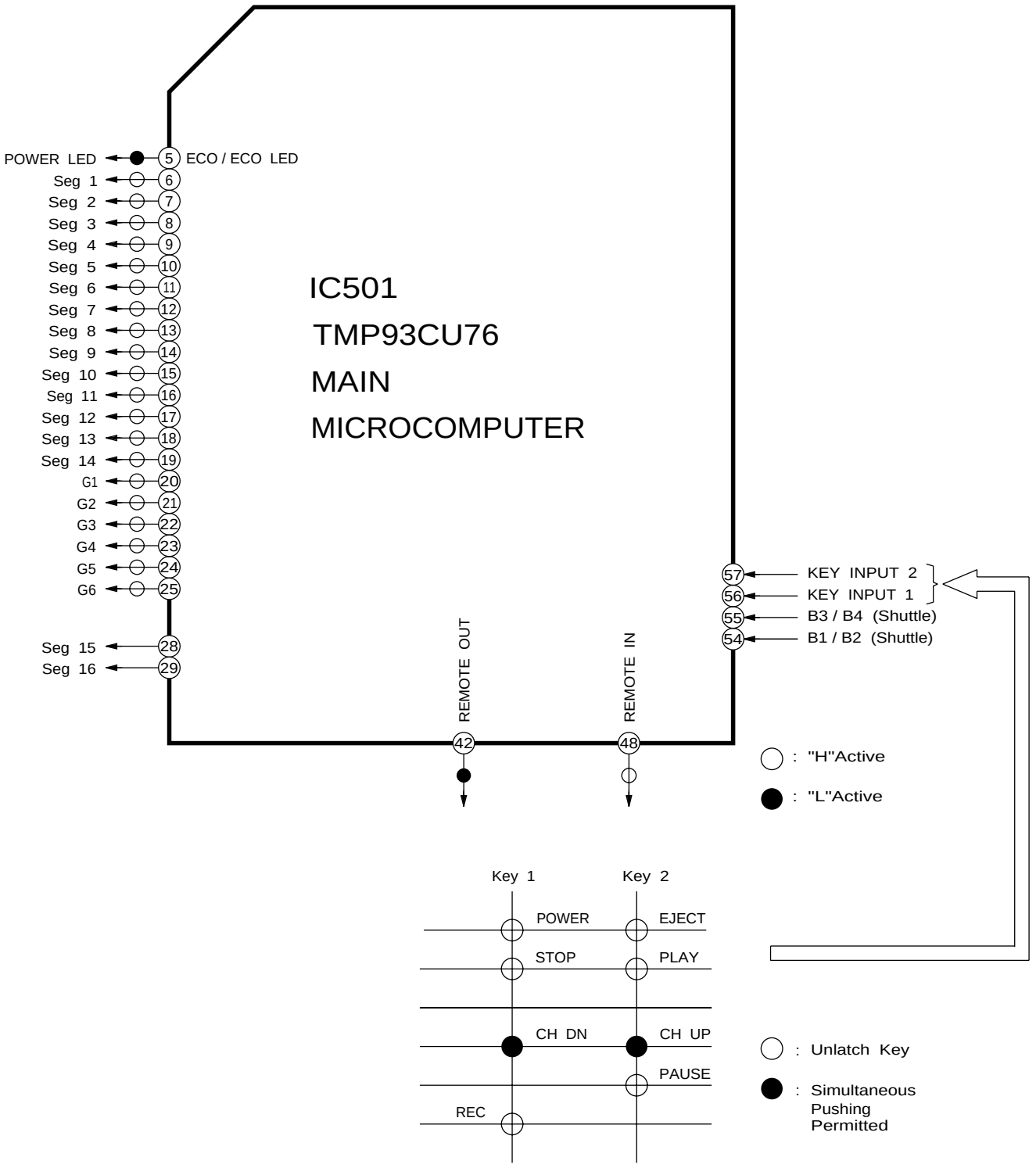
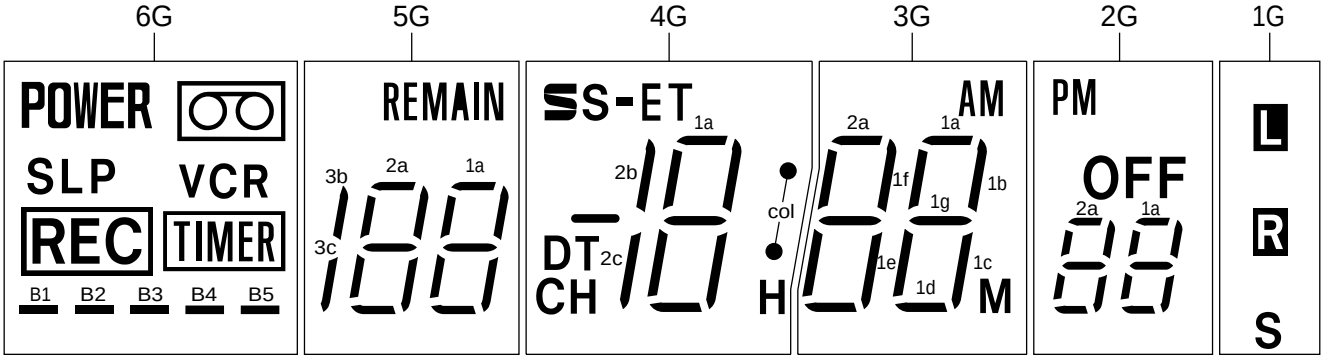

IC501
TMP93CU76
MAIN
MICROCOMPUTER
POWER LED
5
ECO / ECO LED
Seg 1
6
Seg 2
7
Seg 3
8
Seg 4
9
Seg 5
10
Seg 6
11
Seg 7
12
Seg 8
13
Seg 9
14
Seg 10
15
Seg 11
16
Seg 12
17
Seg 13
18
Seg 14
19
G1
20
G2
21
G3
22
G4
23
G5
24
G6
25
Seg 15
28
Seg 16
29
REMOTE OUT
42
REMOTE IN
48
57
KEY INPUT 2
56
KEY INPUT 1
55
B3 / B4 (Shuttle)
54
B1 / B2 (Shuttle)
: "H"Active
: "L"Active
Key 1
Key 2
POWER
EJECT
STOP
PLAY
CH DN
CH UP
PAUSE
REC
: Unlatch Key
: Simultaneous Pushing Permitted

Fig. 7-3-2



	6G	5G	4G	3G	2G	1G
P1	TIMER	1d	1d	1d	1d	–
P2	REC	1e	1e	1e	1e	–
P3	∞	1c	1c	1c	1c	–
P4	–	1g	1g	1g	1g	–
P5	POWER	1f	1f	1f	1f	–
P6	VCR	1b	1b	1b	1b	–
P7	B1	1a	1a	1a	1a	–
P8	B2	REMAIN	S	AM	PM	–
P9	B3	2d	2b,2c	2d	2d	–
P10	B4	2e	CH	2e	2e	–
P11	B5	2c	DT	2c	2c	–
P12	S	2g	:col	2g	2g	L
P13	L	2f	—	2f	2f	–
P14	P	2b	S-ET	2b	2b	R
P15	–	2a	–	2a	2a	–
P16	–	3b,3c	H	M	OFF	S

Fig. 7-3-3

7-4. EDS Block Diagram

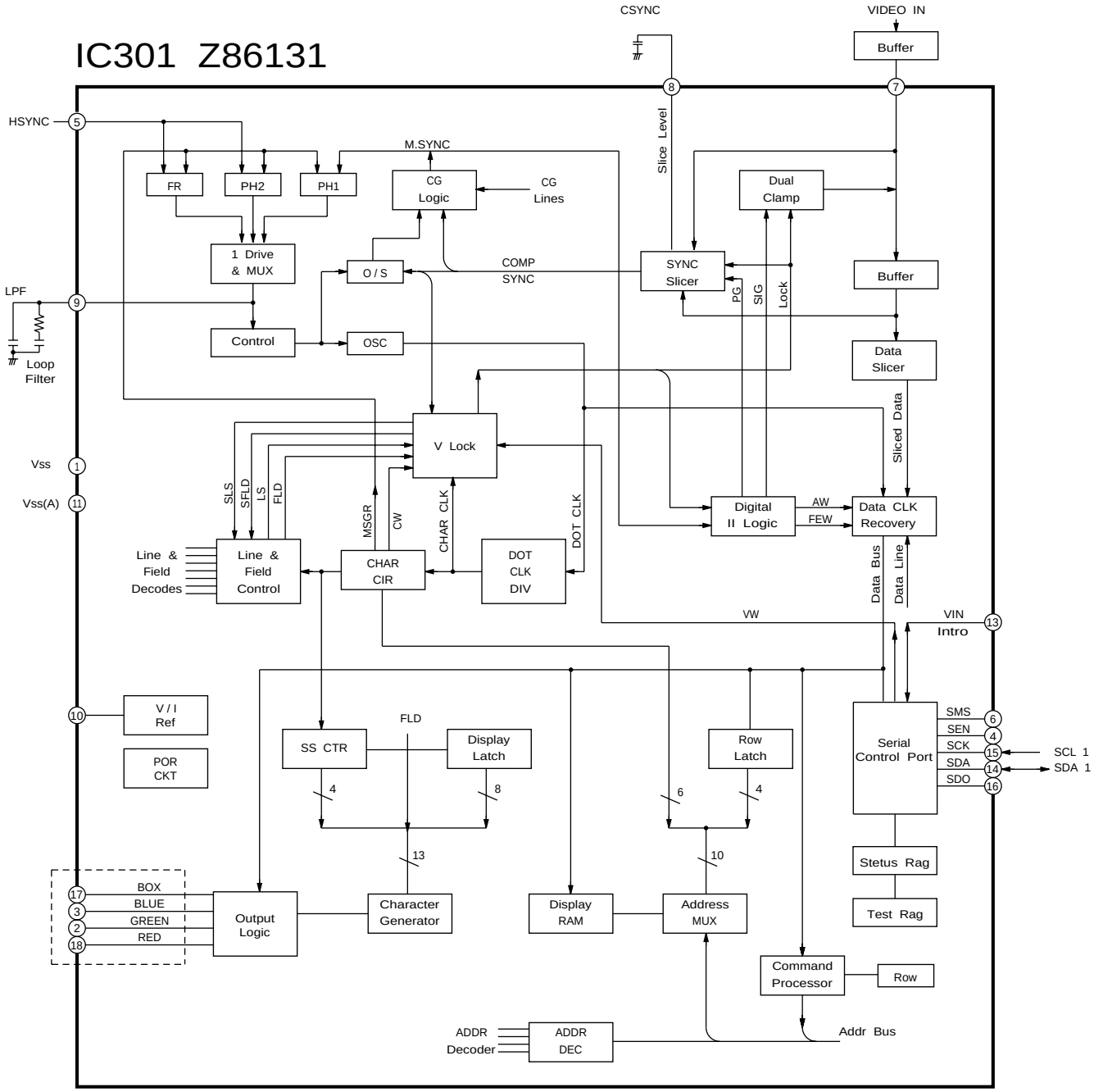


Fig. 7-4-1

7-5. Servo/Logic Block Diagram

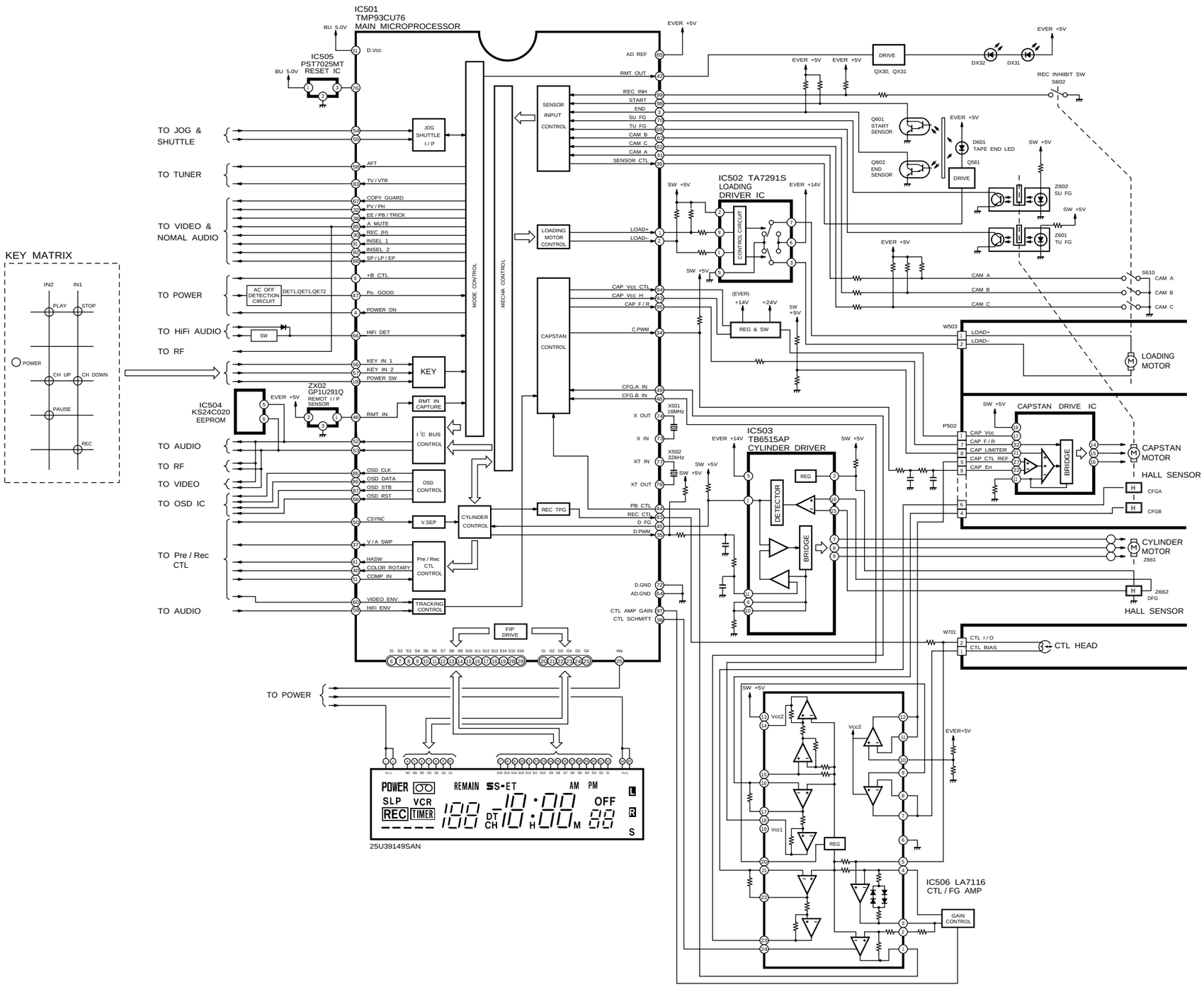


Fig. 7-5-1

7-5-1. IC501 Main Microcomputer Terminal Function

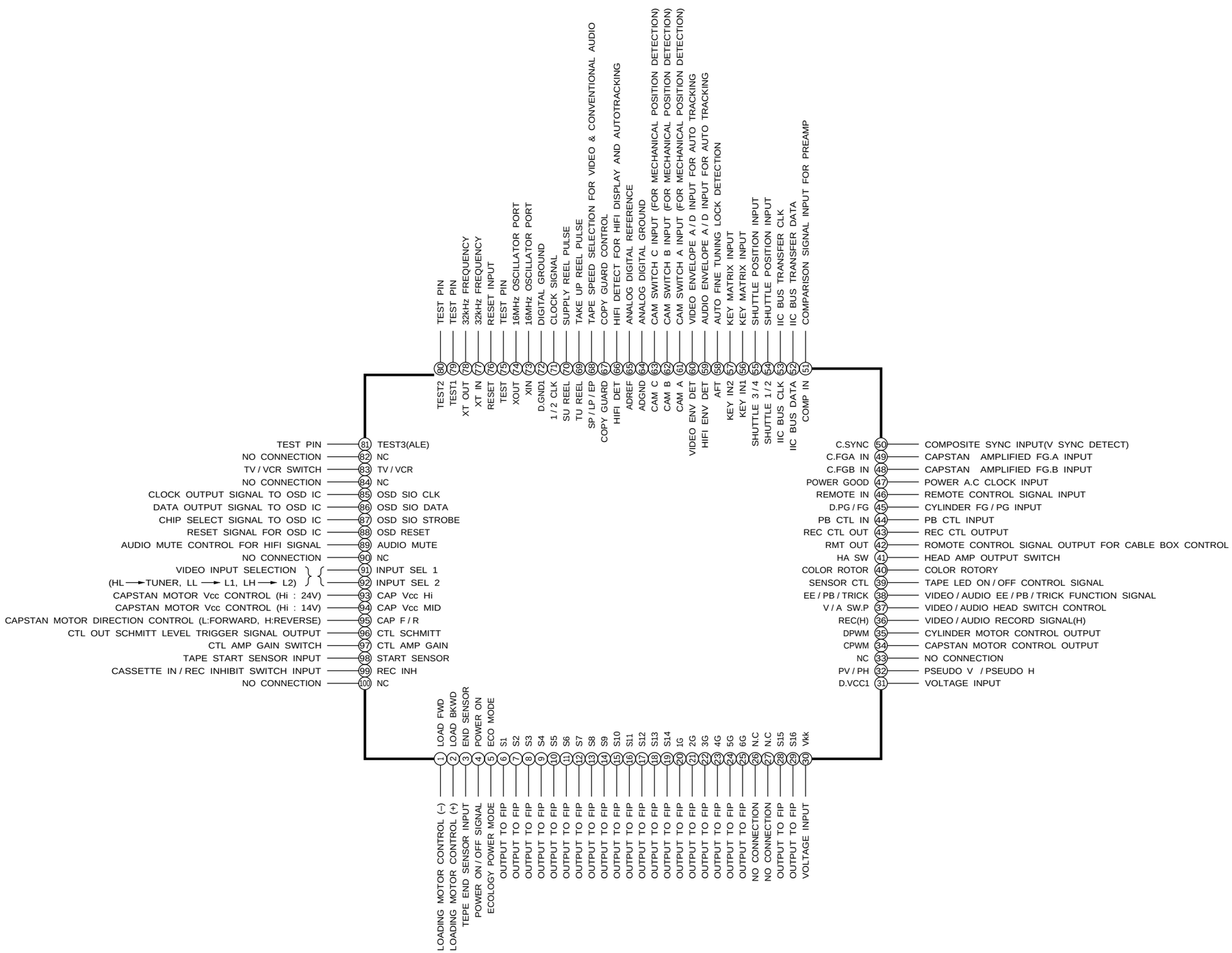

TEST PIN 81 TEST3(ALE)
NO CONNECTION 82 NC
TV / VCR SWITCH 83 TV / VCR
NO CONNECTION 84 NC
CLOCK OUTPUT SIGNAL TO OSD IC 85 OSD SIO CLK
DATA OUTPUT SIGNAL TO OSD IC 86 OSD SIO DATA
CHIP SELECT SIGNAL TO OSD IC 87 OSD SIO STROBE
RESET SIGNAL FOR OSD IC 88 OSD RESET
AUDIO MUTE CONTROL FOR HIFI SIGNAL 89 AUDIO MUTE
NO CONNECTION 90 NC
VIDEO INPUT SELECTION 91 INPUT SEL 1
(HL → TUNER, LL → L1, LH → L2) 92 INPUT SEL 2
CAPSTAN MOTOR Vcc CONTROL (Hi : 24V) 93 CAP Vcc Hi
CAPSTAN MOTOR Vcc CONTROL (Hi : 14V) 94 CAP Vcc MID
CAPSTAN MOTOR DIRECTION CONTROL (L:FORWARD, H:REVERSE) 95 CAP F / R
CTL OUT SCHMITT LEVEL TRIGGER SIGNAL OUTPUT 96 CTL SCHMITT
CTL AMP GAIN SWITCH 97 CTL AMP GAIN
TAPE START SENSOR INPUT 98 START SENSOR
CASSETTE IN / REC INHIBIT SWITCH INPUT 99 REC INH
NO CONNECTION 100 NC
TEST2 80 TEST PIN
TEST1 79 TEST PIN
XT OUT 78 32kHz FREQUENCY
XT IN 77 32kHz FREQUENCY
RESET 76 RESET INPUT
TEST 75 TEST PIN
XOUT 74 16MHz OSCILLATOR PORT
XIN 73 16MHz OSCILLATOR PORT
D.GND1 72 DIGITAL GROUND
1 / 2 CLK 71 CLOCK SIGNAL
SU REEL 70 SUPPLY REEL PULSE
TU REEL 69 TAKE UP REEL PULSE
SP / LP / EP 68 TAPE SPEED SELECTION FOR VIDEO & CONVENTIONAL AUDIO
COPY GUARD 67 COPY GUARD CONTROL
HIFI DET 66 HIFI DETECT FOR HIFI DISPLAY AND AUTOTRACKING
ADREF 65 ANALOG DIGITAL REFERENCE
ADGND 64 ANALOG DIGITAL GROUND
CAM C 63 CAM SWITCH C INPUT (FOR MECHANICAL POSITION DETECTION)
CAM B 62 CAM SWITCH B INPUT (FOR MECHANICAL POSITION DETECTION)
CAM A 61 CAM SWITCH A INPUT (FOR MECHANICAL POSITION DETECTION)
VIDEO ENV DET 60 VIDEO ENVELOPE A / D INPUT FOR AUTO TRACKING
HIFI ENV DET 59 AUDIO ENVELOPE A / D INPUT FOR AUTO TRACKING
AFT 58 AUTO FINE TUNING LOCK DETECTION
KEY IN2 57 KEY MATRIX INPUT
KEY IN1 56 KEY MATRIX INPUT
SHUTTLE 3 / 4 55 SHUTTLE POSITION INPUT
SHUTTLE 1 / 2 54 SHUTTLE POSITION INPUT
IIC BUS CLK 53 IIC BUS TRANSFER CLK
IIC BUS DATA 52 IIC BUS TRANSFER DATA
COMP IN 51 COMPARISON SIGNAL INPUT FOR PREAMP
C.SYNC 50 COMPOSITE SYNC INPUT(V SYNC DETECT)
C.FGA IN 49 CAPSTAN AMPLIFIED FG.A INPUT
C.FGB IN 48 CAPSTAN AMPLIFIED FG.B INPUT
POWER GOOD 47 POWER A.C CLOCK INPUT
REMOTE IN 46 REMOTE CONTROL SIGNAL INPUT
D.PG / FG 45 CYLINDER FG / PG INPUT
PB CTL IN 44 PB CTL INPUT
REC CTL OUT 43 REC CTL OUTPUT
RMT OUT 42 ROMOTE CONTROL SIGNAL OUTPUT FOR CABLE BOX CONTROL
HA SW 41 HEAD AMP OUTPUT SWITCH
COLOR ROTOR 40 COLOR ROTORY
SENSOR CTL 39 TAPE LED ON / OFF CONTROL SIGNAL
EE / PB / TRICK 38 VIDEO / AUDIO EE / PB / TRICK FUNCTION SIGNAL
V / A SW.P 37 VIDEO / AUDIO HEAD SWITCH CONTROL
REC(H) 36 VIDEO / AUDIO RECORD SIGNAL(H)
DPWM 35 CYLINDER MOTOR CONTROL OUTPUT
CPWM 34 CAPSTAN MOTOR CONTROL OUTPUT
NC 33 NO CONNECTION
PV / PH 32 PSEUDO V / PSEUDO H
D.VCC1 31 VOLTAGE INPUT
LOAD FWD 1 LOADING MOTOR CONTROL (–)
LOAD BKWD 2 LOADING MOTOR CONTROL (+)
END SENSOR 3 TEPE END SENSOR INPUT
POWER ON 4 POWER ON / OFF SIGNAL
ECO MODE 5 ECOLOGY POWER MODE
S1 6 OUTPUT TO FIP
S2 7 OUTPUT TO FIP
S3 8 OUTPUT TO FIP
S4 9 OUTPUT TO FIP
S5 10 OUTPUT TO FIP
S6 11 OUTPUT TO FIP
S7 12 OUTPUT TO FIP
S8 13 OUTPUT TO FIP
S9 14 OUTPUT TO FIP
S10 15 OUTPUT TO FIP
S11 16 OUTPUT TO FIP
S12 17 OUTPUT TO FIP
S13 18 OUTPUT TO FIP
S14 19 OUTPUT TO FIP
1G 20 OUTPUT TO FIP
2G 21 OUTPUT TO FIP
3G 22 OUTPUT TO FIP
4G 23 OUTPUT TO FIP
5G 24 OUTPUT TO FIP
6G 25 OUTPUT TO FIP
N.C 26 NO CONNECTION
N.C 27 NO CONNECTION
S15 28 OUTPUT TO FIP
S16 29 OUTPUT TO FIP
Vkk 30 VOLTAGE INPUT

Fig. 7-5-2

7-5-2. IC501 Main Microcomputer Output Polarity

IC501 MAIN MICROCOMPUTER OUTPUT POLARITY

Pin. NO.	MODE / Pin Name	Act.	SLOT IN	SLOT OUT	Load –ing	Un–Load –ing	STOP	STAND –BY	FF	REW	PLAY SP SLP	X2 SP SLP	CUE SP SLP	REV SP SLP	STILL SP SLP	SLOW SP SLP	REC SP SLP	REC PAUSE SP EP	REMOTE POWER OFF	MAIN POWER OFF
1	LOAD (+)	L	L	H	L	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L
2	LOAD (–)	L	H	L	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
4	POWER ON	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	L	L
5	ECO MODE	–	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	L
32	PV / PH	3ST	L	L	L	L	L	L	L	L	L	3ST	3ST	3ST	3ST	3ST	L	L	L	L
34	C–PWM	PWM	PWM	←	←	←	L	L	PWM	←	←	←	←	←	L	PWM	←	L	L	L
35	D–PWM	PWM	L	L	PWM	←	L	PWM	←	←	←	←	←	←	←	←	←	←	L	L
36	REC (H)	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	L	L	L
37	V / A SWP	⎍	⎍	←	←	←	←	←	←	←	←	←	←	←	←	←	←	←	L	L
38	EE / PB / TRICK	–	H	H	H	H	H	H	H	H	OPEN	L	L	L	L	L	H	H	L	L
39	SENSOR CTL	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	⎍	L
40	COLOR ROTOR	–	–	–	–	–	–	–	–	–	⎍	←	←	←	L H	⎍	←	←	L	L
41	HASW	–	–	–	–	–	–	–	–	–	L H	⎍	←	←	←	←	L H	L H	L	L
43	REC CTL OUT	⎍	–	–	–	–	–	–	–	–	–	–	–	–	–	–	⎍	–	OPEN	OPEN
53	IIC BUS CLK	⊤⊤⊤	⊤⊤⊤	←	←	←	←	←	←	←	←	←	←	←	←	←	←	←	OPEN	L
68	SP(L)LP(M)EP(H)	–	L	L	L	L	L	H	M	M	L H	L H	L H	L H	L H	L H	L H	L H	L	L
85	OSD SIO CLK	⊤⊤⊤	⊤⊤⊤	←	←	←	←	←	←	←	←	←	←	←	←	←	←	←	L	L
86	OSD SIO DATA	⊤⊤⊤	⊤⊤⊤	←	←	←	←	←	←	←	←	←	←	←	←	←	←	←	L	L
87	OSD SIO STB	⊤⊤⊤	⊤⊤⊤	←	←	←	←	←	←	←	←	←	←	←	←	←	←	←	L	L
88	OSD RESET	L	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	L	L
89	AUDIO MUTE	H	L	L	L	L	L *1	L *1	L	L	L	H	H	H	H	H	L	L	L	L
91	L1(L) / L2(H)	–	*2	←	←	←	←	←	←	←	←	←	←	←	←	←	←	←	←	H
92	L1(L) / L2(H)	–	*2	←	←	←	←	←	←	←	←	←	←	←	←	←	←	←	←	L
93	CAP Vcc Hi	H	L	L	L	L	L	L	*3	*3	L	L	L	L	L	L	L	L	L	L
94	CAP Vcc Mid	H	H	L	L	L	L	L	*4	*4	L	L	*5	*5	L	L	L	L	L	L
95	CAP F / R	–	L	H	L	H	–	H	L	H	L	L	L	H	L	⎍	L	L	L	L
96	CTL SCHMITT	–	OPEN	←	←	←	←	←	H	H	OPEN	←	←	←	OPEN	←	←	←	←	←
97	CTL AMP GAIN	–	L	L	L	L	L	L	L*6	L*6	L	L	←	←	L	L	L	L	L	L

*1: In the absence of c.sync, Audio Mute goes "H".

*2: L1 / L2: Line1=L / L, Line2=L / H, Tuner=H / L

*3: "H" when the control speed is greater than LPx20, and "L" in other modes.

*4: "L" when the control speed is greater than LPx20, and "H" in other modes.

*5: "H" in ACC. Search (SPx7, EPx21). "L" in other modes.

*6: "H" when the control speed is greater than LPx5.

Table 7-5-1

7-5-3. Logic Mode Shift Table

Key / Current Mode	STOP	PLAY	FF	REW	SLOW	PAUSE / STILL	REC	EJECT	COUNTER / TIMER	REMOCON POWER	MAIN POWER	INDEX	COUNTER RESET	TAPE START	TAPE END
STOP	–	○	○	○	×	×	○	EJECT	○	POWER OFF	POWER OFF	SEARCH	○	SHORT FF	SHORT REW
FF	○	○	CUE	○	×	×	×	EJECT	○	POWER OFF	POWER OFF	×	○	–	STOP
REW	○	○	○	REVIEW	×	×	×	EJECT	○	POWER OFF	POWER OFF	×	○	STOP	–
PLAY	○	X2	CUE	REVIEW	○	STILL	×	EJECT	○	POWER OFF	POWER OFF	SEARCH	○	–	REWIND
X2	○	○	CUE	REVIEW	○	STILL	×	EJECT	○	POWER OFF	POWER OFF	×	○	–	REWIND
SLOW	○	○	CUE	REVIEW	○	STILL	×	EJECT	○	POWER OFF	POWER OFF	×	○	–	REWIND
STILL	○	FRAME FEEDING	CUE	REVIEW	○	PLAY	REC PAUSE	EJECT	○	POWER OFF	POWER OFF	×	○	–	REWIND
CUE	○	○	*1	REVIEW	×	×	×	EJECT	○	POWER OFF	POWER OFF	×	○	–	REWIND
REVIEW	○	○	CUE	*3	×	×	×	EJECT	○	POWER OFF	POWER OFF	×	○	STOP	–
ACC. CUE	○	○	*2	REVIEW	×	×	×	EJECT	○	POWER OFF	POWER OFF	×	○	–	REWIND
ACC. REVIEW	○	○	CUE	*4	×	×	×	EJECT	○	POWER OFF	POWER OFF	×	○	STOP	–
REC	○	×	×	×	×	REC PAUSE	*5	×	○	POWER OFF	POWER OFF	VISS MARK	○	–	REWIND
REC PAUSE	○	×	×	×	×	REC	×	×	○	POWER OFF	POWER OFF	×	○	–	REWIND
VISS MARK	○	×	×	×	×	×	×	×	×	POWER OFF	POWER OFF	–	○	–	REWIND
POWER OFF	×	×	×	×	×	×	×	EJECT	×	POWER ON	POWER OFF	×	×	–	–
MAIN POWER OFF	×	×	×	×	×	×	×	×	×	×	POWER ON	×	×	–	–
TIMER STAND–BY	×	×	×	×	×	×	×	×	×	×	POWER OFF	×	×	–	–
TIMER REC	×	×	×	×	×	×	×	×	○	×	POWER OFF	VISS MARK	○	–	TIMER STAND–BY

*1: Pressing for less than one second shifts the mode to FF, and press for longer than one second shifts it to ACC. CUE.

*2: Pressing with a remote controller shifts the mode to FF.

*3: Pressing for less than one second shifts the mode to REW, and press for longer than one second shifts it to ACC. REVIEW.

*4: Pressing with a remote controller shifts the mode to REW.

*5: Input into the main unit shifts the mode to the instant recording.

Table 7-5-2

7-6. Video and Conventional Audio Block Diagram

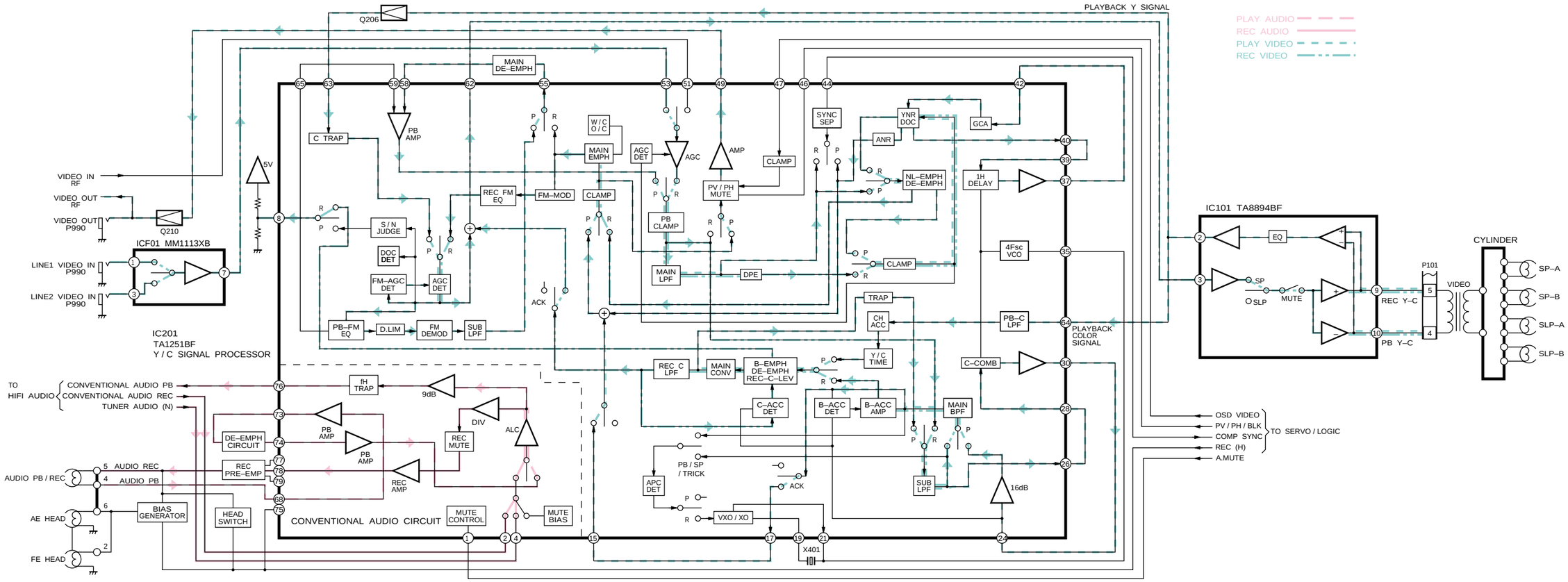


Fig. 7-6-1

7-7. Hi-Fi Audio Block Diagram

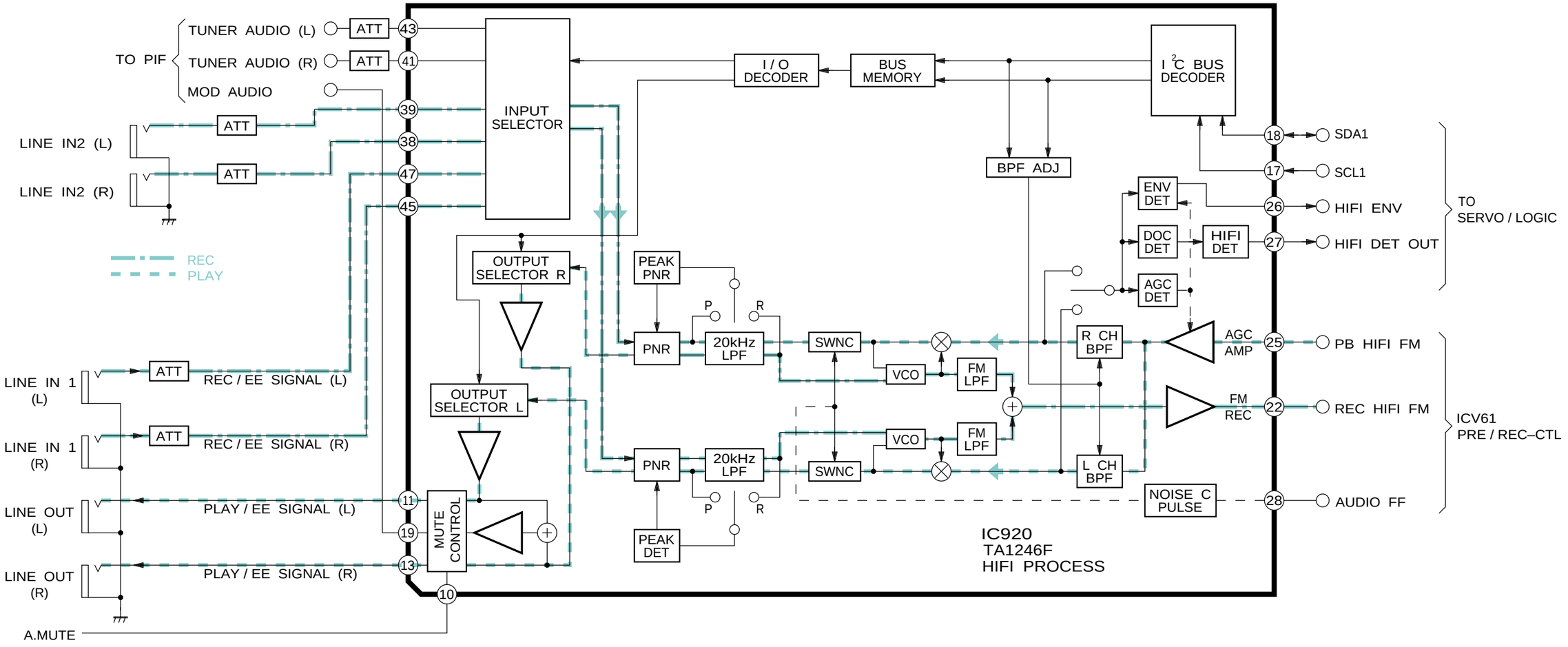


Fig. 7-7-1

7-7-1. Audio Level Chart

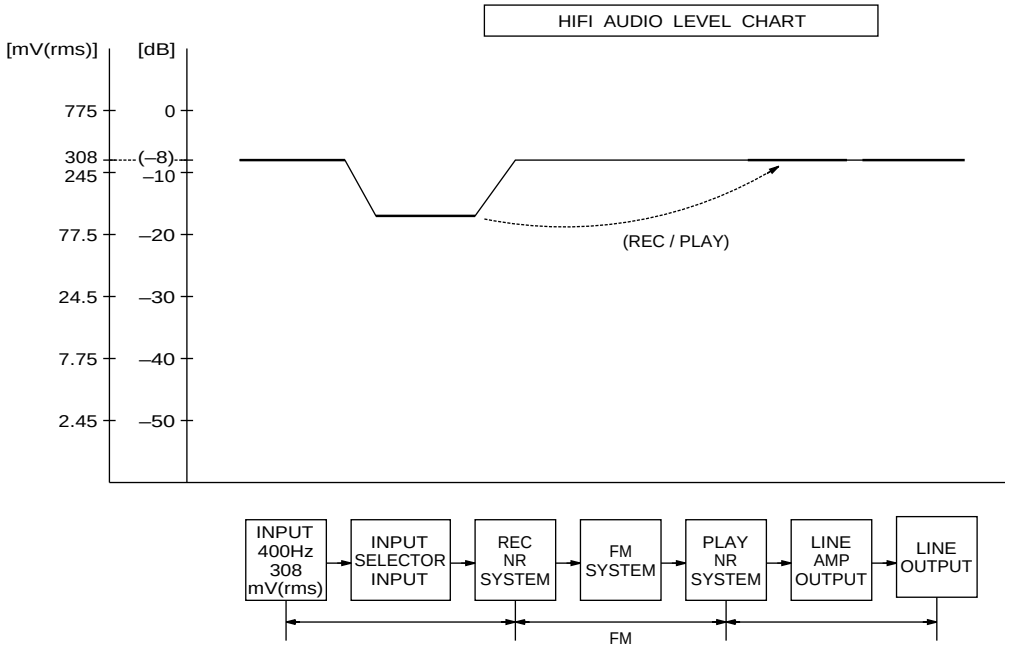


Fig. 7-7-2

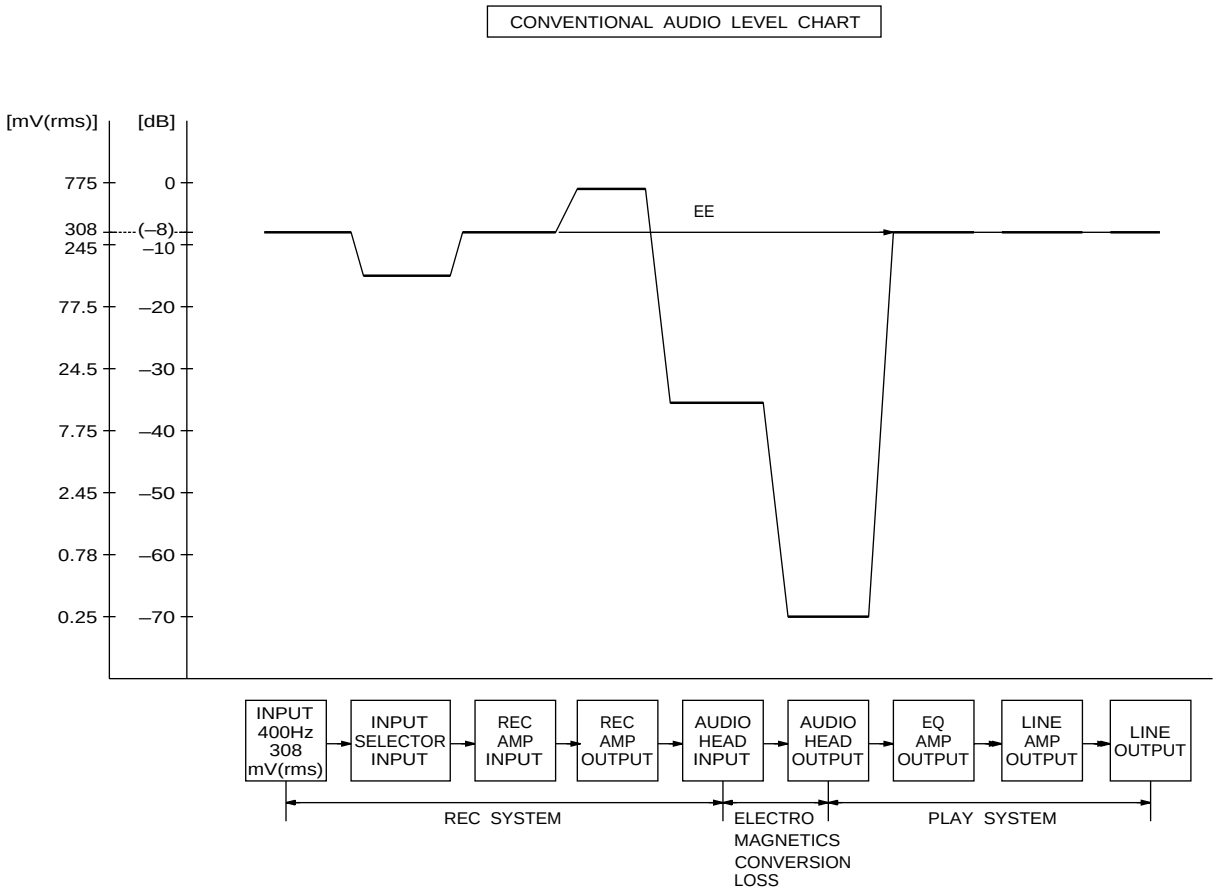
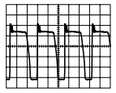


Fig. 7-7-3

8. CIRCUIT DIAGRAMS

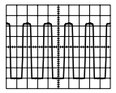
8-1. Waveform

Power

① Q801, COLLECTOR J-2

REC
V : 50V/div
H : 5µs/div

② Q802, BASE K-2

REC
V : 0.5V/div
H : 5µs/div

③ Q870, Pin 3 L-3

REC
V : 1V/div
H : 10ms/div

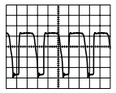
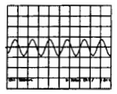
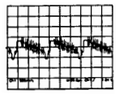
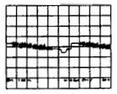
④ T802, Pin 9 J-4

REC
V : 5V/div
H : 5µs/div

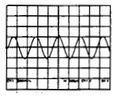
Fig. 8-1-1

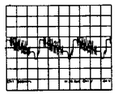
PIF

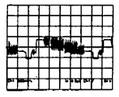
⑤ H001, Pin 1 A-15

AUDIO IN
PLAY
V : 500mV/div
H : 200µs/div

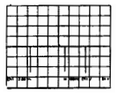
⑥ H001, Pin 5 B-15

VIDEO IN
PLAY
V : 500mV/div
H : 20µs/div

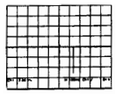
⑦ H001, Pin 19 D-15

VIDEO OUT
PLAY
V : 500mV/div
H : 10µs/div

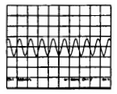
⑧ H001, Pin 1 A-15

AUDIO IN
REC
V : 500mV/div
H : 500µs/div

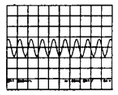
⑨ H001, Pin 5 B-15

VIDEO IN
REC
V : 500mV/div
H : 20µs/div

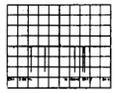
⑩ H001, Pin 19 D-15

VIDEO OUT
REC
V : 500mV/div
H : 10µs/div

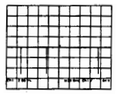
⑪ ICD01, Pin 15 C-18

SDA1
PLAY
V : 2V/div
H : 100ms/div

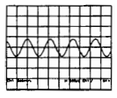
⑫ ICD01, Pin 16 C-18

SCL1
PLAY
V : 2V/div
H : 100ms/div

⑬ ICD01, Pin 25 B-16

NORMAL
AUDIO OUT
PLAY
V : 500mV/div
H : 1ms/div

⑭ ICD01, Pin 27 B-16

TUNER
AUDIO OUT
PLAY
V : 500mV/div
H :1ms/div

⑮ ICD01, Pin 15 C-18

SDA1
REC
V : 2V/div
H : 100ms/div

⑯ ICD01, Pin 16 C-18

SCL1
REC
V : 2V/div
H : 20ms/div

⑰ ICD01, Pin 25 C-17

NORMAL
AUDIO OUT
REC
V : 500mV/div
H : 500µs/div

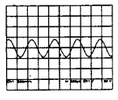
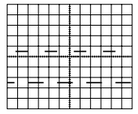
⑱ ICD01, Pin 27 B-16

TUNER
AUDIO OUT
REC
V : 500mV/div
H : 500µs/div

Fig. 8-1-2

KDB

⑲ IC501, Pin 6 K-10

SCAN1
V : 10V/div
H : 2ms/div

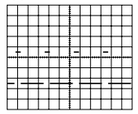
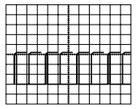
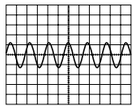
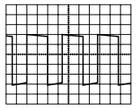
⑳ IC501, Pin 20 J-11

G1
V : 10V/div
H : 2ms/div

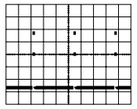
Fig. 8-1-3

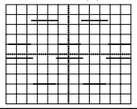
Selvo/Logic

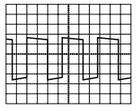
㉑ IC501, Pin 50 I-12

C SYNC
V : 1V/div
H : 20µs/div

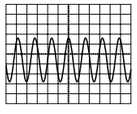
㉒ IC506, Pin 22 H-7

CFGA AMP
PLAY (SP)
V : 500mV/div
H : 500µs/div

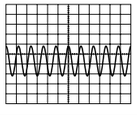
㉓ IC506, Pin 1 H-7

CTL OUT
PLAY (EP)
V : 1V/div
H : 10ms/div

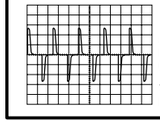
㉔ IC501, Pin 32 K-12

PV/PH
STILL
V : 1V/div
H : 5ms/div

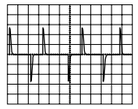
㉕ IC501, (a) Pin 34 J-12
(b) Pin 35 J-12

(a)
PLAY (EP)
(b)
V : 2V/div
H : 5µs/div

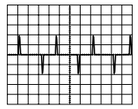
㉖ IC501, Pin 43 J-12

REC CTL OUT
REC
V : 1V/div
H : 10ms/div

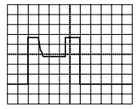
㉗ IC501, Pin 78 I-10

V : 1V/div
H : 20µs/div

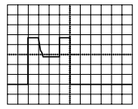
㉘ IC501, Pin 74 I-10

V : 1V/div
H : 0.5µs/div

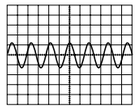
㉙ IC506, Pin 3 H-6

CTL. AMP
EP CUEx21
(AC)
V : 1V/div
H : 500µs/div

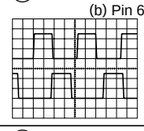
㉚ IC506, Pin 3 H-6

CTL. AMP
SP CUE (x7)
(AC)
V : 1V/div
H : 1ms/div

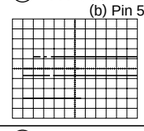
㉛ IC506, Pin 3 H-6

CTL. AMP
PLAY SP
(AC)
V : 1V/div
H : 10ms/div

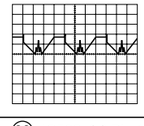
㉜ P502, Pin 9 G-7

CAP ERR
EP SLOW
V : 1V/div
H : 10ms/div

㉝ P502, Pin 9 G-7

CAP ERR
SP SLOW
V : 1V/div
H : 20ms/div

㉞ IC506, Pin 17 G-7

CFGB AMP
SP PLAY
V : 500mV/div
H : 500µs/div

㉟ IC501, (a) Pin 70 H-10
(b) Pin 69 I-10

(a)
SP PLAY
(b)
V : 2V/div
H : 100ms/div

㊱ IC501, (a) Pin 52 I-11
(b) Pin 53 I-11

(a)
(b)
V : 2V/div
H : 200µs/div

㊲ IC503, Pin 7, 8, 9 F-13
F-14

V : 5V/div
H : 2ms/div

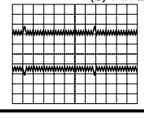
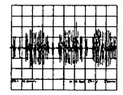
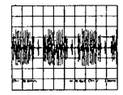
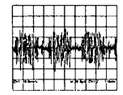
㊳ IC503, (a) Pin 15 G-14
(b) Pin 16 G-14

(a)
(b)
V : 500mV/div
H : 5ms/div

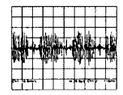
Fig. 8-1-4

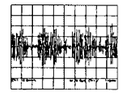
Video/Audio

㊴ IC201, Pin 15 E-5

PLAY
V : 20mV/div
H : 20µs/div

㊵ IC201, Pin 17 E-6

PLAY
V : 20mV/div
H : 20µs/div

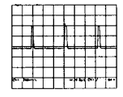
㊶ IC201, Pin 24 D-6

PLAY
V : 10mV/div
H : 20µs/div

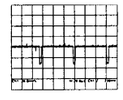
㊷ IC201, Pin 26 D-7

PLAY
V : 10mV/div
H : 20µs/div

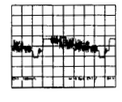
㊸ IC201, Pin 30 D-7

PLAY
V : 10mV/div
H : 20µs/div

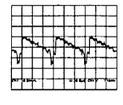
㊹ IC201, Pin 42 B-6

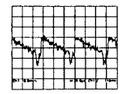
PLAY
V : 20mV/div
H : 20µs/div

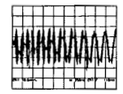
㊺ IC201, Pin 44 B-6

PLAY
V : 200mV/div
H : 20µs/div

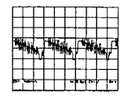
㊻ IC201, Pin 47 B-6

PLAY
V : 20mV/div
H : 20µs/div

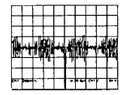
㊼ IC201, Pin 49 B-5

PLAY
V : 100mV/div
H : 10µs/div

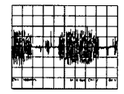
㊽ IC201, Pin 58 B-4

PLAY
V : 10mV/div
H : 20µs/div

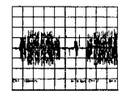
㊾ IC201, Pin 59 B-4

PLAY
V : 10mV/div
H : 20µs/div

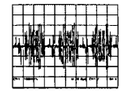
㊿ IC201, Pin 63 B-4

PLAY
V : 10mV/div
H : 250ns/div

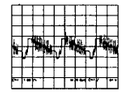
(51) Q210, Emitter B-11

PLAY
V : 100mV/div
H : 20µs/div

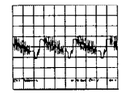
(52) IC201, Pin 24 D-6

REC
V : 200mV/div
H : 20µs/div

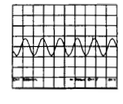
(53) IC201, Pin 26 D-7

REC
V : 100mV/div
H : 10µs/div

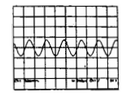
(54) IC201, Pin 28 D-7

REC
V : 100mV/div
H : 10µs/div

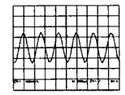
(55) IC201, Pin 30 D-7

REC
V : 100mV/div
H : 20µs/div

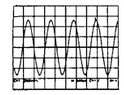
(56) IC201, Pin 49 B-5

REC
V : 1V/div
H : 20µs/div

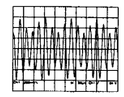
(57) IC201, Pin 51 B-5

REC
V : 500mV/div
H : 20µs/div

(58) IC920, Pin 14 G-15

LINE OUT
V : 500mV/div
H : 200µs/div

(59) IC920, Pin 19 H-15

V : 500mV/div
H : 200µs/div

(60) IC920, Pin 31 H-16

PLAY
V : 100mV/div
H : 200µs/div

(61) IC920, Pin 19 H-15

MOD
AUDIO
V : 200mV/div
H : 500µs/div

(62) IC920, Pin 22 H-15

REC
V : 200mV/div
H : 1µs/div

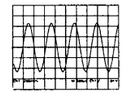
(63) IC920, Pin 35 H-17

REC
V : 200mV/div
H : 500µs/div

Fig. 8-1-5

8-2. Cricuit Diagram *Divided Circuit Diagram (For Printing)*

IC101 TA251CF MAIN LUMINANCE / CHROMINANCE SIGNAL PROCESSOR

IC301 Z86131 EDS

ICD01 μPC1854AGT

IC101 TMP88CU76 MAIN MICROCOMPUTER

IC920 TA1246AF AUDIO HIFI PROCESSOR

IC201 TA8954BF PRE / REC-CTL

3 IN 1 TUNER H001 TMDH2

CH SW

CYLINDER

JSB

FCB

Note :
The meaning of "KETSU" is "Not used".

PLAY : AUDIO
REC : AUDIO
PLAY : VIDEO
REC : VIDEO

[V] : EE
[V] : PLAY
V : REC

SERVO LOCATION	PIN	MODE EE	PLAY	REC
IC502	1	4.5	4.5	4.5
	2	4.5	4.5	4.5
	3	4.5	4.5	4.5
	4	4.5	4.5	4.5
	5	4.5	4.5	4.5
	6	4.5	4.5	4.5
	7	4.5	4.5	4.5
	8	4.5	4.5	4.5
	9	4.5	4.5	4.5
	10	0	0	0
IC503	1	5.0	5.0	5.0
	2	5.0	5.0	5.0
	3	5.0	5.0	5.0
	4	5.0	5.0	5.0
	5	5.0	5.0	5.0
	6	5.0	5.0	5.0
	7	5.0	5.0	5.0
	8	5.0	5.0	5.0
	9	5.0	5.0	5.0
	10	5.0	5.0	5.0
	11	5.0	5.0	5.0
	12	0	0	0
	13	0	0	0
	14	5.0	5.0	5.0
	15	5.0	5.0	5.0
	16	5.0	5.0	5.0
IC504	1	5.0	5.0	5.0
	2	5.0	5.0	5.0
	3	5.0	5.0	5.0
	4	5.0	5.0	5.0
	5	5.0	5.0	5.0
	6	5.0	5.0	5.0
	7	5.0	5.0	5.0
	8	5.0	5.0	5.0
IC505	1	2.5	2.5	
	2	2.5	2.5	
	3	2.5	2.5	
	4	5.0	5.0	
	5	5.0	5.0	
	6	5.0	5.0	
	7	5.0	5.0	
	8	5.0	5.0	
IC506	1	5.0	5.0	5.0
	2	5.0	5.0	5.0
	3	5.0	5.0	5.0
	4	5.0	5.0	5.0
	5	5.0	5.0	5.0
	6	5.0	5.0	5.0
	7	5.0	5.0	5.0
	8	5.0	5.0	5.0
	9	5.0	5.0	5.0
	10	5.0	5.0	5.0
	11	5.0	5.0	5.0
	12	5.0	5.0	5.0
	13	5.0	5.0	5.0
	14	5.0	5.0	5.0
	15	5.0	5.0	5.0
	16	5.0	5.0	5.0

AUDIO LOCATION	PIN	MODE EE	PLAY	REC
IC920	1	4.5	4.5	4.5
	2	4.5	4.5	4.5
	3	4.5	4.5	4.5
	4	4.5	4.5	4.5
	5	4.5	4.5	4.5
	6	4.5	4.5	4.5
	7	4.5	4.5	4.5
	8	4.5	4.5	4.5
	9	4.5	4.5	4.5
	10	0	0	0
	11	4.5	4.5	4.5
	12	4.5	4.5	4.5
	13	4.5	4.5	4.5
	14	4.5	4.5	4.5
	15	4.5	4.5	4.5
	16	4.5	4.5	4.5
	17	4.5	4.5	4.5
	18	4.5	4.5	4.5
	19	4.5	4.5	4.5
	20	4.5	4.5	4.5
	21	4.5	4.5	4.5
	22	4.5	4.5	4.5
	23	4.5	4.5	4.5
	24	4.5	4.5	4.5
	25	4.5	4.5	4.5
	26	4.5	4.5	4.5
	27	4.5	4.5	4.5
	28	4.5	4.5	4.5
	29	4.5	4.5	4.5
	30	4.5	4.5	4.5
	31	4.5	4.5	4.5
	32	4.5	4.5	4.5
	33	4.5	4.5	4.5
	34	4.5	4.5	4.5
	35	4.5	4.5	4.5
	36	4.5	4.5	4.5
	37	4.5	4.5	4.5
	38	4.5	4.5	4.5
	39	4.5	4.5	4.5
	40	4.5	4.5	4.5
	41	4.5	4.5	4.5
	42	4.5	4.5	4.5
	43	4.5	4.5	4.5
	44	4.5	4.5	4.5
	45	4.5	4.5	4.5
	46	4.5	4.5	4.5
	47	4.5	4.5	4.5
	48	4.5	4.5	4.5
	49	4.5	4.5	4.5
	50	4.5	4.5	4.5
	51	4.5	4.5	4.5
	52	4.5	4.5	4.5
	53	4.5	4.5	4.5
	54	4.5	4.5	4.5
	55	4.5	4.5	4.5
	56	4.5	4.5	4.5
	57	4.5	4.5	4.5
	58	4.5	4.5	4.5
	59	4.5	4.5	4.5
	60	4.5	4.5	4.5
	61	4.5	4.5	4.5
	62	4.5	4.5	4.5
	63	4.5	4.5	4.5
	64	4.5	4.5	4.5
	65	4.5	4.5	4.5
	66	4.5	4.5	4.5
	67	4.5	4.5	4.5
	68	4.5	4.5	4.5
	69	4.5	4.5	4.5
	70	4.5	4.5	4.5
	71	4.5	4.5	4.5
	72	4.5	4.5	4.5
	73	4.5	4.5	4.5
	74	4.5	4.5	4.5
	75	4.5	4.5	4.5
	76	4.5	4.5	4.5
	77	4.5	4.5	4.5
	78	4.5	4.5	4.5
	79	4.5	4.5	4.5
	80	4.5	4.5	4.5

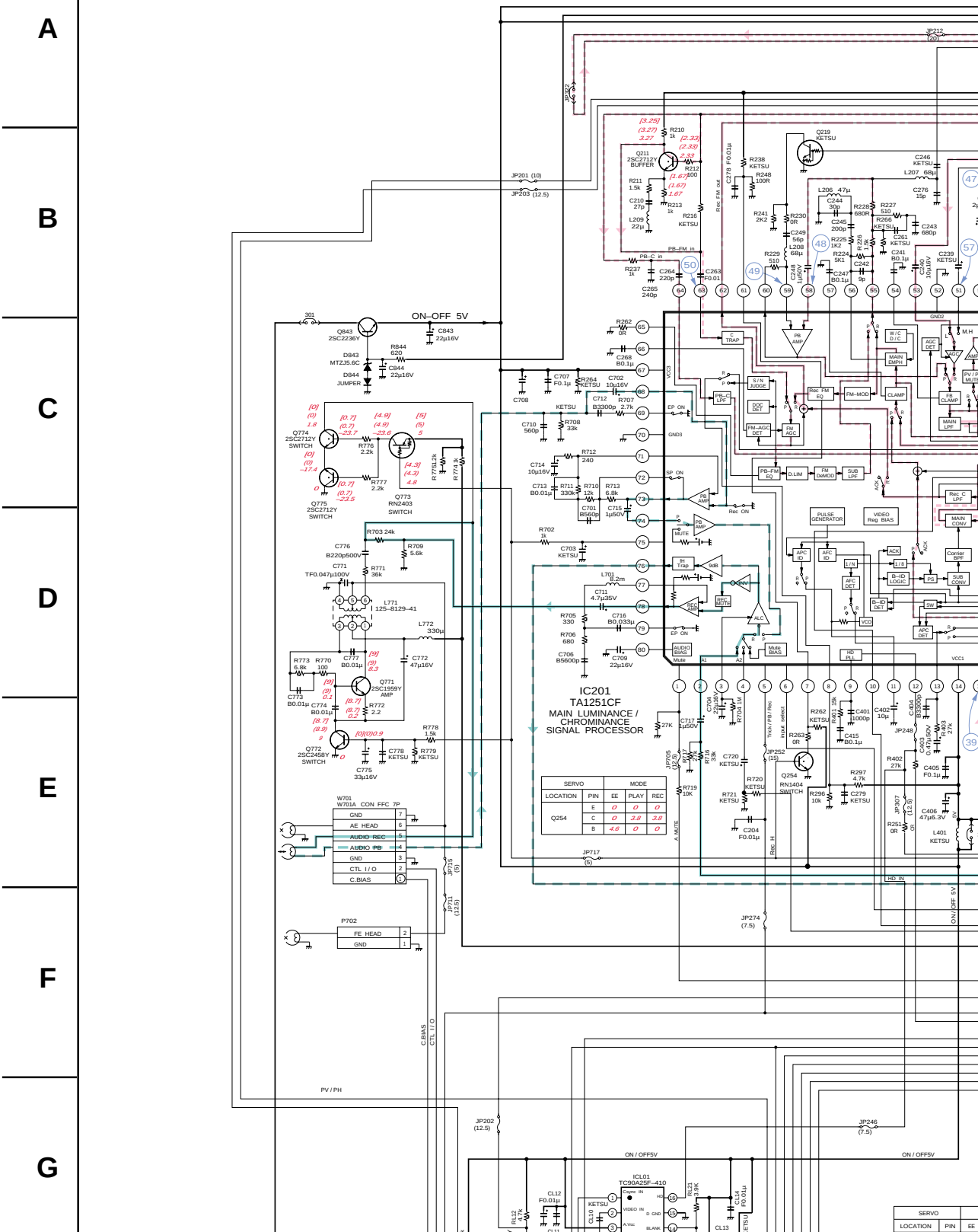
VIDEO LOCATION	PIN	MODE EE	PLAY	REC
IC101	1	2.5	2.5	
	2	2.5	2.5	
	3	2.5	2.5	
	4	2.5	2.5	
	5	2.5	2.5	
	6	2.5	2.5	
	7	2.5	2.5	
	8	2.5	2.5	
	9	2.5	2.5	
	10	0	0	
	11	0	0	
	12	2.5	2.5	
	13	2.5	2.5	
	14	2.5	2.5	
	15	2.5	2.5	
	16	2.5	2.5	
	17	2.5	2.5	
	18	2.5	2.5	
	19	2.5	2.5	
	20	2.5	2.5	
	21	2.5	2.5	
	22	2.5	2.5	
	23	2.5	2.5	
	24	2.5	2.5	
	25	2.5	2.5	
	26	2.5	2.5	
	27	2.5	2.5	
	28	2.5	2.5	
	29	2.5	2.5	
	30	2.5	2.5	
	31	2.5	2.5	
	32	2.5	2.5	
	33	2.5	2.5	
	34	2.5	2.5	
	35	2.5	2.5	
	36	2.5	2.5	
	37	2.5	2.5	
	38	2.5	2.5	
	39	2.5	2.5	
	40	2.5	2.5	
	41	2.5	2.5	
	42	2.5	2.5	
	43	2.5	2.5	
	44	2.5	2.5	
	45	2.5	2.5	
	46	2.5	2.5	
	47	2.5	2.5	
	48	2.5	2.5	
	49	2.5	2.5	
	50	2.5	2.5	
	51	2.5	2.5	
	52	2.5	2.5	
	53	2.5	2.5	
	54	2.5	2.5	
	55	2.5	2.5	
	56	2.5	2.5	
	57	2.5	2.5	
	58	2.5	2.5	
	59	2.5	2.5	
	60	2.5	2.5	
	61	2.5	2.5	
	62	2.5	2.5	
	63	2.5	2.5	
	64	2.5	2.5	
	65	2.5	2.5	
	66	2.5	2.5	
	67	2.5	2.5	
	68	2.5	2.5	
	69	2.5	2.5	
	70	2.5	2.5	
	71	2.5	2.5	
	72	2.5	2.5	
	73	2.5	2.5	
	74	2.5	2.5	
	75	2.5	2.5	
	76	2.5	2.5	
	77	2.5	2.5	
	78	2.5	2.5	
	79	2.5	2.5	
	80	2.5	2.5	

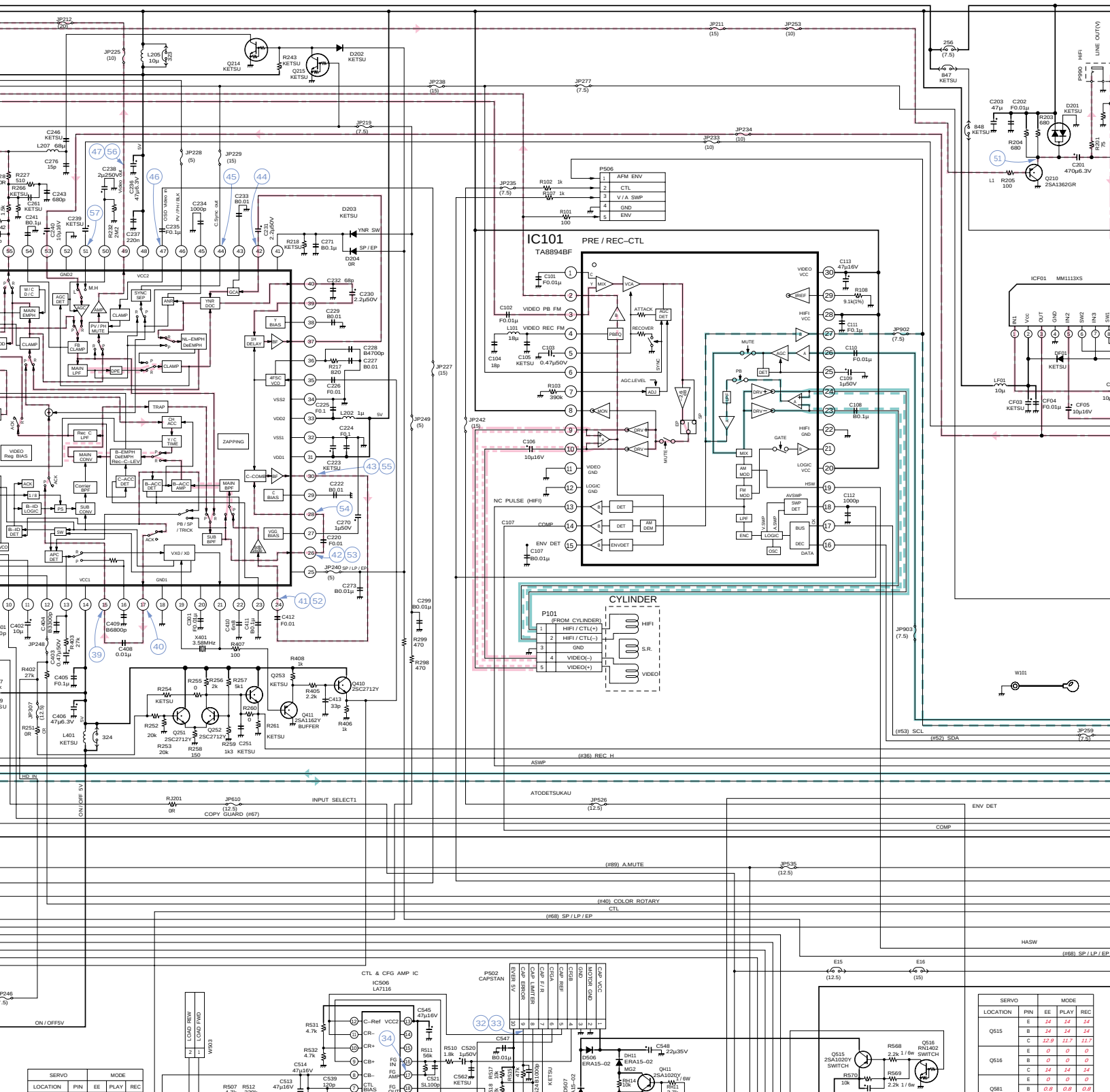
VIDEO LOCATION	PIN	MODE MSS
IC301	1	0
	2	0
	3	0
	4	4.83
	5	5.03 5V / 74.5.08
	6	4.83
	7	4.409
	8	4.598
	9	4.8816
	10	4.183
	11	0
	12	4.83
	13	4.8866
	14	4.83
	15	5.03 5V / 74.5.08
	16	0
	17	-
	18	-

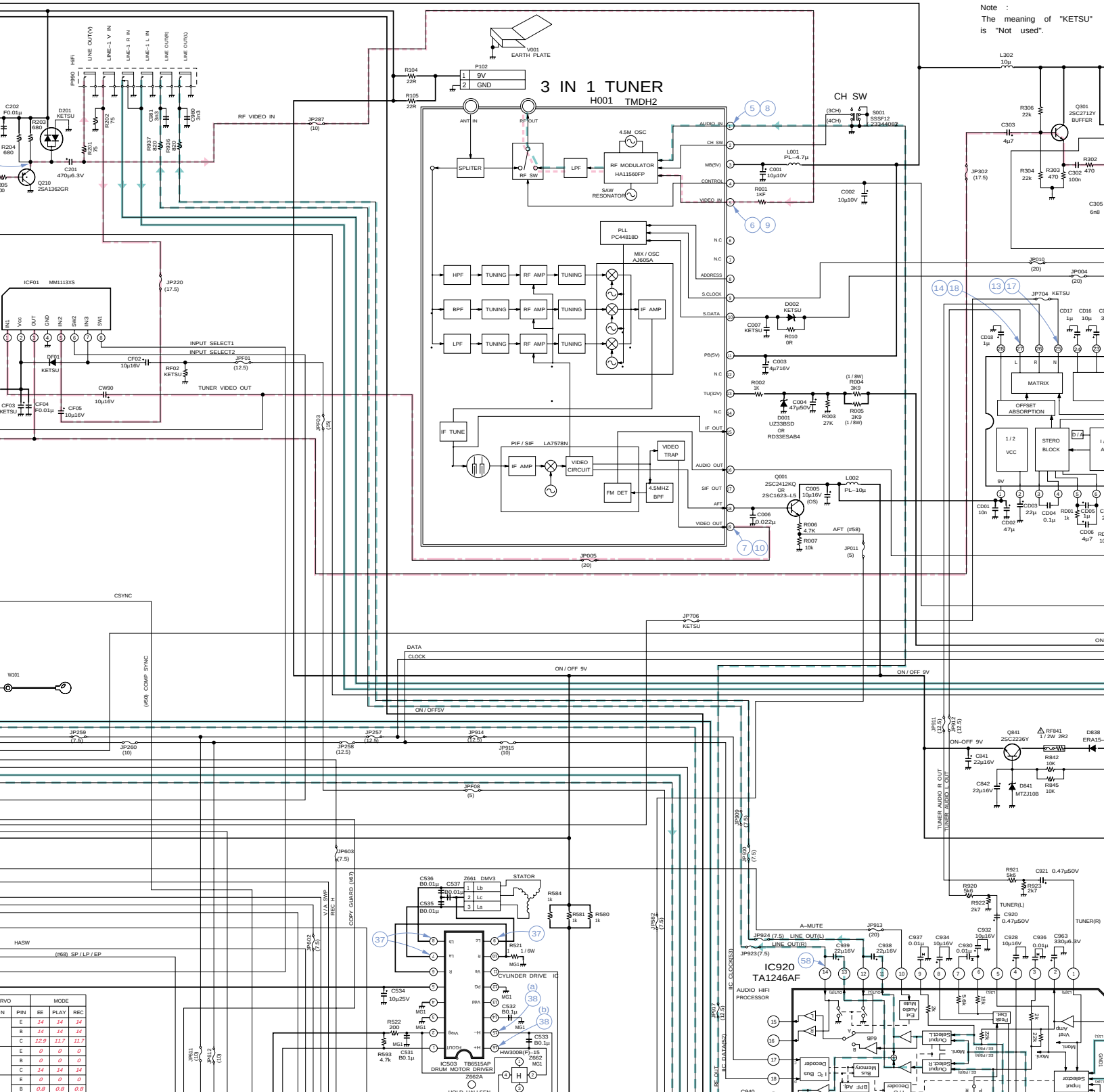
CRITICAL / SAFETY COMPONENTS LIST			
LOCATION NO.	PART NO.	LOCATION NO.	PART NO.
PB01	23144B58	Q670	2SB1463S4
PB02	23144B51	PB01	70178315
C601	24482925k	PB01	70434088
C604	24492584	R810	24322278
C802	24492565	RP827	24322151
C803	24492592	RP841	24544229
C811	24492583	T801	23111681
Q804	2SB0406L4	T802	70151304S

Fig. 8-2-1

8-2. Cricuit Diagram



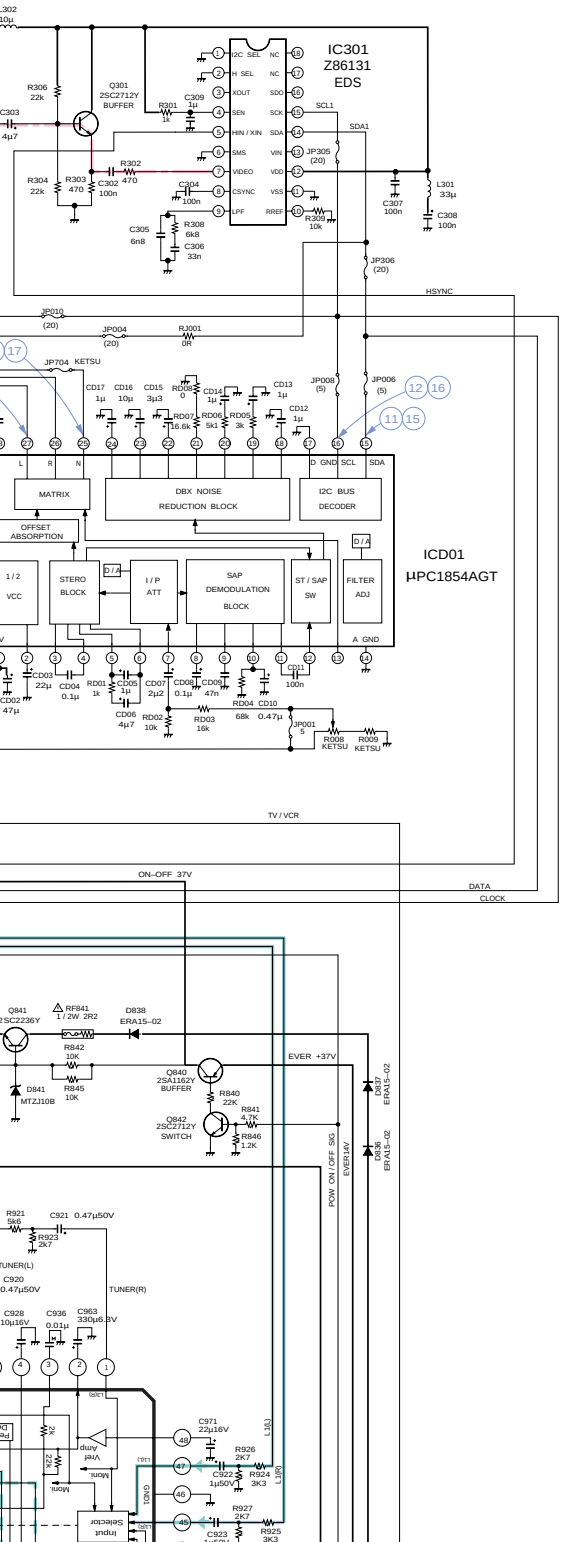

5
6
7
8
9
10
11
IC101
PRE / REC–CTL
TA8894BF
P506
AFM ENV
CTL
V / A SWP
GND
ENV
CYLINDER
P101
(FROM CYLINDER)
HIFI / CTL(+)
HIFI / CTL(–)
GND
VIDEO(–)
VIDEO(+)
HIFI
S.R.
VIDEO
IC506
LA7116
CTL & CFG AMP IC
P502
CAPSTAN
SERVO
MODE
LOCATION
PIN
EE
PLAY
REC
Q515
Q516
Q581
ON / OFF5V
INPUT SELECT1
COPY GUARD (#67)
(#53) SCL
(#52) SDA
(#36) REC_H
(#89) A.MUTE
(#40) COLOR ROTARY
CTL
(#68) SP / LP / EP
ENV DET
COMP
ASWP
ATODETSUKAU
HASW
HD IN
LOAD REW
LOAD FWD
W503
W101
LINE OUT(V)
HIFI


11
12
13
14
15
16
17
Note :
The meaning of "KETSU" is "Not used".
3 IN 1 TUNER
H001 TMDH2
V001
EARTH PLATE
P102
1 9V
2 GND
R104 22R
R105 22R
ANT IN
RF OUT
SPLITER
RF SW
LPF
4.5M OSC
RF MODULATOR
HA11560FP
SAW RESONATOR
AUDIO IN
CH SW
MB(5V)
CONTROL
VIDEO IN
L001 PL–4.7µ
C001 10µ10V
R001 1KF
C002 10µ10V
CH SW
(3CH)
(4CH)
S001 SSSF12 23344082
PLL PC44818D
MIX / OSC AJ605A
N.C
N.C
ADDRESS
S.CLOCK
S.DATA
PB(5V)
N.C
TU(32V)
N.C
IF OUT
HPF
BPF
LPF
TUNING
RF AMP
IF AMP
D002 KETSU
C007 KETSU
R010 0R
C003 4µ716V
R002 1K
C004 47µ50V
D001 UZ33BSD OR RD33ESAB4
R003 27K
R005 3K9 (1 / 8W)
R004 3K9 (1 / 8W)
IF TUNE
PIF / SIF LA7578N
IF AMP
VIDEO CIRCUIT
VIDEO TRAP
FM DET
4.5MHZ BPF
AUDIO OUT
SIF OUT
AFT
VIDEO OUT
Q001 2SC2412KQ OR 2SC1623–L5
C005 10µ16V (OS)
L002 PL–10µ
C006 0.022µ
R006 4.7K
R007 10K
AFT (#58)
JP011 (5)
JP005 (20)
JP010 (20)
JP004 (20)
JP704 KETSU
Q301 2SC2712Y BUFFER
L302 10µ
R306 22k
R304 22k
R303 470
C303 4µ7
C302 100n
R302 470
JP302 (17.5)
C305 6n8
ICF01 MM1113XS
IN1 Vcc OUT GND IN2 SW2 IN3 SW1
JP220 (17.5)
INPUT SELECT1
INPUT SELECT2
DF01 KETSU
CF02 10µ16V
JPF01 (12.5)
RF02 KETSU
TUNER VIDEO OUT
CW90 10µ16V
CF03 KETSU
CF04 F0.01µ
CF05 10µ16V
JPF03 (10)
RF VIDEO IN
JP287 (10)
C202 F0.01µ
D201 KETSU
R203 680
R204 680
C201 470µ6.3V
Q210 2SA1362GR
HiFi
P990
LINE OUT(V)
LINE–1 V IN
LINE–1 R IN
LINE–1 L IN
LINE OUT(R)
LINE OUT(U)
R201 F5
R202 F5
C981 3n3
C980 3n3
R937 820
R936 820
CSYNC
(#50) COMP SYNC
W101
DATA
CLOCK
ON / OFF 9V
ON / OFF5V
JP706 KETSU
JP259 (7.5)
JP260 (10)
JP257 (12.5)
JP258 (12.5)
JP914 (12.5)
JP915 (10)
JPF08 (5)
JP603 (7.5)
JP902 (7.5)
V / A SWP
REC. H
COPY GUARD (#67)
HASW
(#68) SP / LP / EP
C536 B0.01µ
C537 B0.01µ
C535 B0.01µ
Z661 DMV3
STATOR
Lb
Lc
La
R584 1k
R581 1k
R580 1k
R521 1 / 6W
MG1
CYLINDER DRIVE IC
C534 10µ25V
R522 200
R593 4.7k
C531 B0.1µ
C532 B0.1µ
C533 B0.1µ
IC503 TB6515AP DRUM MOTOR DRIVER
HW300B(F)–15
Z662
Z662A
HALL ELEMENT
JP911 (10)
JP912 (10)
JP582 (7.5)
JP909 (7.5)
JP910 (7.5)
JP917 (17.5)
IIC CLOCK(5V)
IIC DATA(5V)
IIC OUT
A–MUTE
JP913 (20)
JP924 (7.5) LINE OUT(L)
LINE OUT(R)
JP923 (7.5)
IC920 TA1246AF
AUDIO HIFI PROCESSOR
C939 22µ16V
C938 22µ16V
C937 0.01µ
C934 10µ16V
C932 10µ16V
C930 0.01µ
C928 10µ16V
C936 0.01µ
C963 330µ6.3V
R921 5k6
C921 0.47µ50V
R920 5k6
R923 2k7
R922 2k7
C920 0.47µ50V
TUNER(L)
TUNER(R)
JP911 (12.5)
JP912 (12.5)
Q841 2SC2236Y
RF841 1 / 2W 2R2
D838 ERA15–
ON–OFF 9V
C841 22µ16V
C842 22µ16V
D841 MTZJ10B
R842 10K
R845 10K
TUNER AUDIO R OUT
TUNER AUDIO L OUT
MATRIX
OFFSET ABSORPTION
1 / 2 VCC
STERO BLOCK
D / A
CD01 10n
CD02 47µ
CD03 22µ
CD04 0.1µ
RD01 1k
CD05 1µ
CD06 4µ7
CD17 1µ
CD16 10µ
CD18 1µ
RF
MODE
PIN
EE
PLAY
REC
E 14 14 14
B 14 14 14
C 12.9 11.7 11.7
E 0 0 0
B 0 0 0
C 14 14 14
E 0 0 0
B 0.8 0.8 0.8

:
meaning of "KETSU"
Not used".

PLAY AUDIO
REC AUDIO
PLAY VIDEO
REC VIDEO

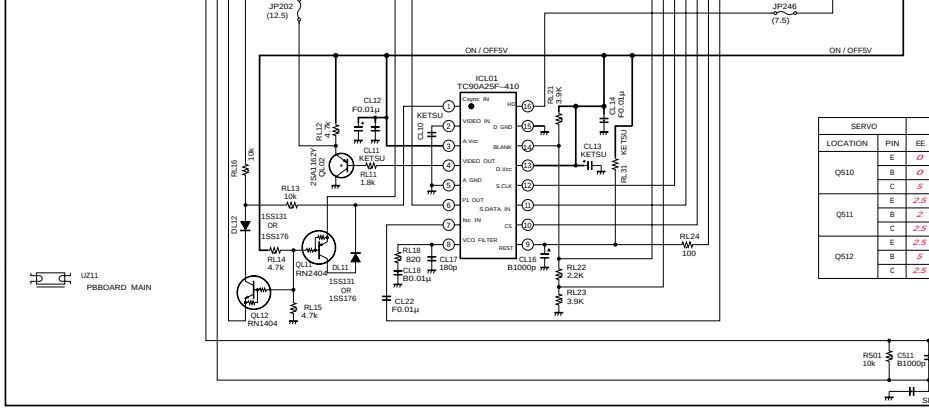
[V] : EE
(V) : PLAY
V : REC



SERVO		MODE		
LOCATION	PIN	EE	PLAY	REC
IC502	1	0	0	0
	2	5.7	5.6	5.6
	3	0	0	0
	4	–	–	–
	5	0	0	0
	6	14.1	14	14
	7	0	0	0
	8	14.1	14	14
	9	0	0	0
IC503	1	0	1	1
	2	1.4	1.4	1.4
	3	0	0	0
	4	0	0	0
	5	14.1	14	14
	6	0	0	0
	7	14.1	10	10
	8	14.1	10	10
	9	14.1	10	10
	10	0	0	0
	11	0	2.7	2.6
	12	0	0	0
	13	4.9	5.1	5.1
	14	3.1	3.2	3.2
	15	0.6	0.6	0.6
	16	0.8	0.7	0.7
IC504	1	0	0	0
	2	0	0	0
	3	0	0	0
	4	0	0	0
	5	4.9	4.9	4.9
	6	4.9	4.9	4.9
	7	0	0	0
	8	4.8	4.8	4.8
IC505	1	4.8	4.8	4.7
	2	0	0	0
	3	4.8	4.8	4.8
IC506	1	0	–	–
	2	2.4	–	–
	3	2.5	–	–
	4	2.5	2.5	–
	5	2.5	2.5	–
	6	0	0	0
	7	2.5	2.5	2.5
	8	2.5	2.5	2.5
	9	2.5	2.5	2.5
	10	2.5	2.5	2.5
	11	2.5	2.5	2.5
	12	2.5	2.5	2.5
	13	5	5	5
	14	4.5	4.5	4.5
	15	2.5	2.5	2.5
	16	2.5	2.5	2.5
	17	2.5	–	–
	18	4.3	–	–
	19	5	5	5
	20	2.5	2.5	2.5
	21	2.5	2.5	2.5
	22	2.5	–	–
	23	4.3	–	–
	24	2.5	2.5	2.5
IC501	1	0	0	0
	2	0	2.5	0
	3	0	3.2	0
	4	–	–	–
	5	0.2	2.4	2.5
	6	–	–	–
	7	0	0	0
	8	4.8	3.1	4.8
	9	0	0	0
	10	4.8	4.8	4.8
	11	0	0	0
	12	0	0	0
	13	5	5	5
	14	4.8	4.8	4.8
	15	–	–	–
	16	0	0	0
	17	4.8	4.8	4.8
	18	4.7	4.7	4.7
	19	–	–	–
	20	–	–	–
	21	4.8	0	0
	22	0	4.8	0
	23	–	–	–
	24	–	–	–
	25	0	0	0
	26	0	0	0
	27	–	–	–
	28	0	0	0
	29	–	–	–
	30	0	0	0
	31	0	0	0
	32	2.3	2.4	2.3
	33	2.3	2.4	2.7
	34	2.3	2.4	2.3
	35	2.3	2.4	2.3
	36	2.3	2.3	2.3
	37	2.3	2.4	2.3
	38	2.4	4	2.3
	39	2.2	0.7	2.1
	40	2.4	2.4	2.4
	41	2.4	2.4	2.4
	42	2.4	2.4	2.4
	43	2.4	2.4	2.4
	44	2.4	2.4	2.4
	45	4.8	4.8	4.8
	46	1.9	2.8	2.8
	47	1	1	1
	48	4.7	4.7	4.7
	49	1.5	4.7	0
	50	4.7	4.7	4.7
	51	4.9	0	0

AUDIO		MODE		
LOCATION	PIN	EE	PLAY	REC
IC920	1	4.5	4.5	4.5
	2	4.5	4.5	4.5
	3	4.5	4.5	4.5
	4	4.5	4.5	4.5
	5	4.5	4.5	4.5
	6	4.5	4.5	4.5
	7	4.5	4.5	4.5
	8	0.5	0.4	0.5
	9	4.5	4.4	4.5
	10	0	0	0
	11	4.5	4.5	4.5
	12	0	0	0
	13	4.5	4.5	4.5
	14	0	0	0
	15	0	0	0
	16	0.9	0.9	0.9
	17	4.9	4.9	4.9
	18	4.9	4.9	4.9
	19	4.5	4.6	4.5
	20	0	0	0
	21	0	0	0
	22	0	0	2.3
	23	4.9	4.9	4.9
	24	0	0.9	1
	25	2.1	2.1	2.1
	26	0	1.4	2
	27	0	0	0
	28	4.5	4.5	4.5
	29	0	0	0
	30	2.2	0.8	2.2
	31	4.4	4.4	4.4
	32	0.4	0.2	0.4
	33	4.5	0.2	4.5
	34	4.5	4.5	4.5
	35	4.5	4.5	4.5
	36	4.5	4.5	4.5
	37	9	9	9
	38	4.4	4.4	4.4
	39	4.4	4.4	4.4
	40	0	0	0
	41	4.4	4.4	4.4
	42	0	0	0
	43	4.4	4.4	4.6
	44	0	0	0
	45	4.4	4.4	4.4
	46	0	0	0
	47	4.5	4.4	4.4
	48	4.4	4.5	4.5

VIDEO		MODE		
LOCATION	PIN	EE	PLAY	REC
IC201	1	0	0	0
	2	2.4	2.4	2.4
	3	0	0	0
	4	2.4	2.4	2.4
	5	4.3	2.4	4.3
	6	4.7	4.7	4.7
	7	1.6	1.6	1.6
	8	2.4	1.2	2.4
	9	2.1	2.1	2.1
	10	0	0	0
	11	2.9	2.9	2.9
	12	0.9	0.9	0.9
	13	2.9	2.9	2.9
	14	4.9	4.9	4.9
	15	1.8	1.9	1.8
	16	2.9	2.9	2.9
	17	2.2	2.2	2.2
	18	0	0	0
	19	2.2	1.8	2.2
	20	2.4	2.4	2.4
	21	2.7	2.4	2.7
	22	3.1	3.2	3.1
	23	1.8	1.9	1.8
	24	2.9	2.9	2.9
	25	1.6	0	0
	26	1.9	1.9	1.9
	27	10.5	10.5	10.5
	28	2.1	2.1	2.1
	29	1.6	1.6	1.6
	30	3.3	3.3	3.3
	31	4.9	4.9	4.9
	32	0	0	0
	33	4.9	4.9	4.9
	34	0	0	0
	35	2.5	2.5	2.5
	36	1.9	1.9	1.9
	37	3.7	3.8	3.7
	38	1.7	1.7	1.7
	39	2.3	2.3	2.3
	40	2.6	2.6	2.6
	41	4.9	0	0
	42	2.7	2.7	2.7
	43	2.6	2.8	2.6
	44	0.4	0.4	0.4
	45	1.7	1.7	1.7
	46	1.5	1.5	1.5
	47	2.7	2.7	2.7
	48	4.9	4.9	4.9
	49	1.9	1.8	1.9
	50	2.1	2.3	2.1
	51	2.5	2.5	2.5
	52	0	0	0
	53	2.5	2.5	2.5
	54	2.5	2.5	2.5
	55	2.4	2.1	2.4
	56	2.4	2.1	2.4
	57	2.5	2.5	2.5
	58	2.8	2.7	2.8
	59	2.4	2.1	2.3
	60	2.4	2.1	2.3

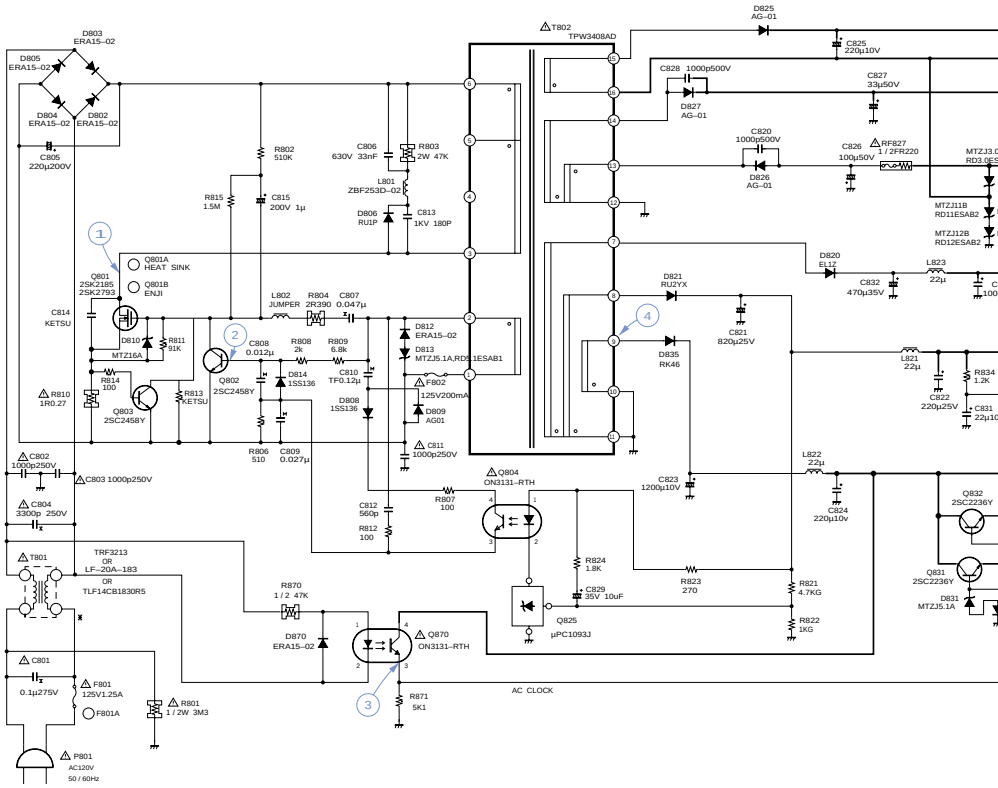


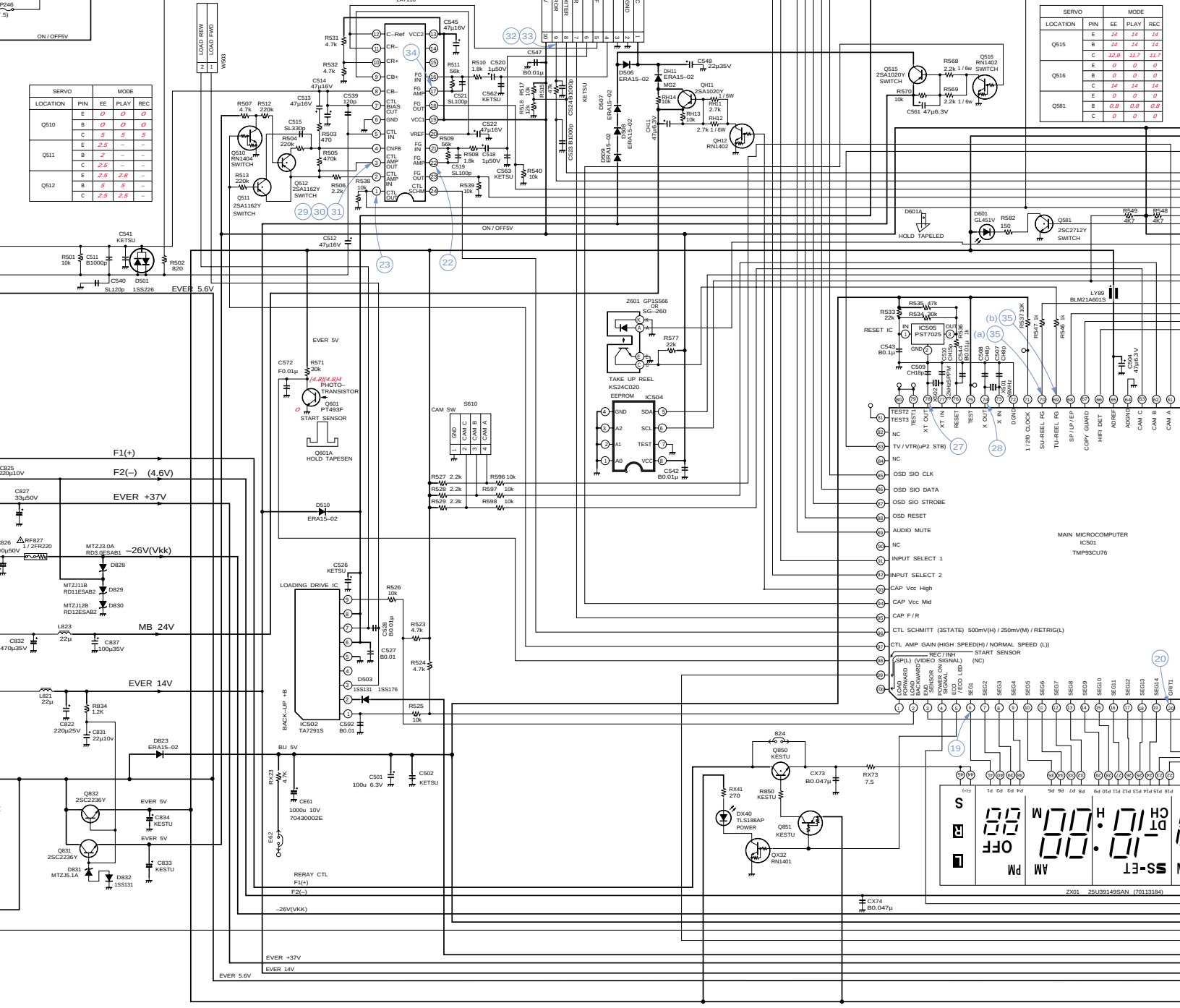
SERVO		
LOCATION	PIN	EE
Q510	E	0
	B	0
	C	5
Q511	E	2.5
	B	2
	C	2.5
Q512	E	2.5
	B	5
	C	2.5

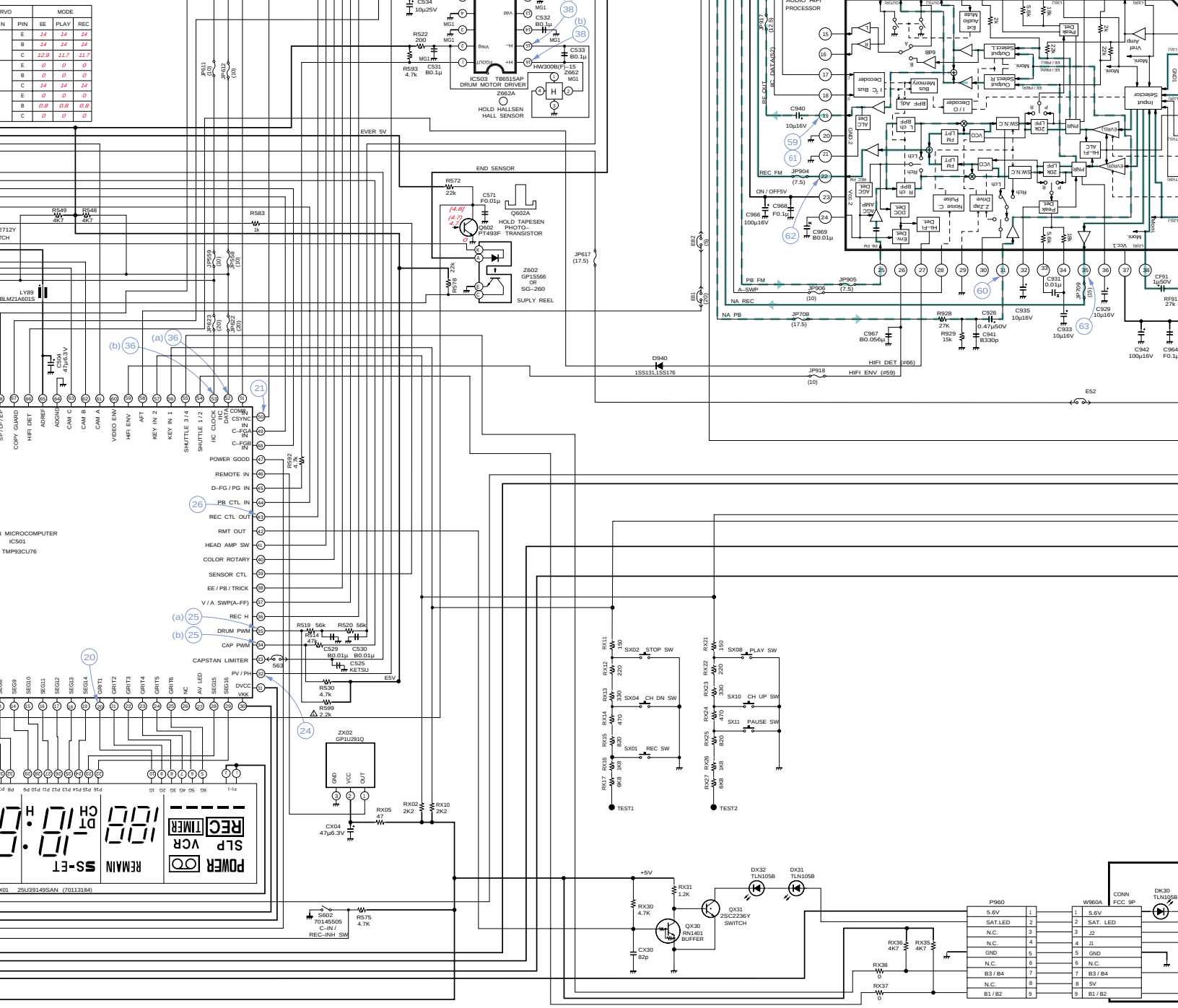
CRITICAL / SAFETY COMPONENTS LIST

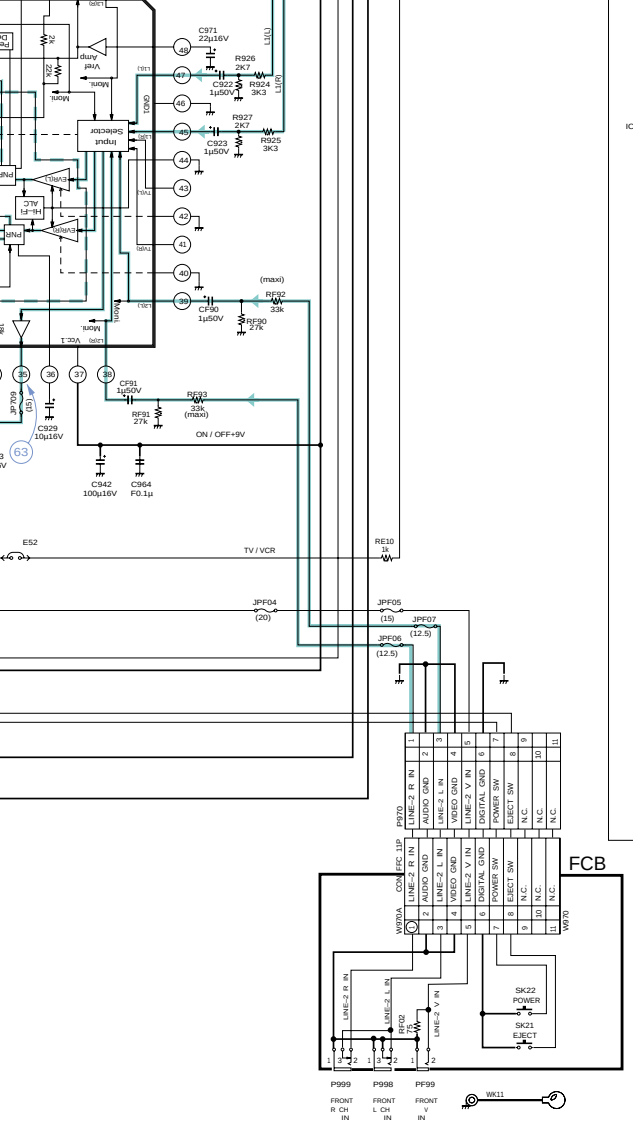
LOCATION NO.	PART NO.
F801	23144558
F802	23144581
C801	24082926
C804	24092584
C802	24092581
C803	24092581
C811	24092581
Q804	23904054

LOCATION NO.	PART NO.
Q870	23904054
P801	70175915
R801	70424086
R810	24322278
RF827	24531221
RF841	24546229
T801	23211691
T802	70213246




F1(+)
F2(–) (4.6V)
EVER +37V
–26V(Vkk)
MB 24V
EVER 14V
EVER 5.6V
BU 5V
EVER 5V
ON / OFF5V
MAIN MICROCOMPUTER
IC501
TMP93CU76
RESET IC
IC505
PST7025
EEPROM
IC504
KS24C020
TAKE UP REEL
KS24C020
LOADING DRIVE IC
IC502
TA7291S
RERAY CTL
F1(+)
F2(–)
–26V(VKK)
EVER +37V
EVER 14V
EVER 5.6V
HOLD TAPELED
SWITCH
ZX01 25U39149SAN (70113184)


MODE
PIN
EE
PLAY
REC
IC503 TB6515AP
DRUM MOTOR DRIVER
HW300B(F)–15
Z662A
HOLD HALLSEN
HALL SENSOR
END SENSOR
Q602A
HOLD TAPESEN
PHOTO-
Q602
PT493F TRANSISTOR
Z602
GP1S566
OR
SG–260
SUPLY REEL
AUDIO AMP
PROCESSOR
ON / OFF5V
REC FM
PB FM
A–SWP
NA REC
NA PB
HIFI DET (#66)
HIFI ENV (#59)
D940
1SS131,1SS176
E52
MICROCOMPUTER
IC501
TMP93CU76
REC CTL OUT
PB CTL IN
POWER GOOD
REMOTE IN
D–FG / PG IN
RMT OUT
HEAD AMP SW
COLOR ROTARY
SENSOR CTL
EE / PB / TRICK
V / A SWP(A–FF)
REC H
DRUM PWM
CAP PWM
CAPSTAN LIMITER
PV / PH
DVCC
VKK
ZX02
GP1U291Q
GND
VCC
OUT
S602
70145505
C–IN /
REC–INH SW
SX02 STOP SW
SX04 CH DN SW
SX01 REC SW
SX08 PLAY SW
SX10 CH UP SW
SX11 PAUSE SW
TEST1
TEST2
QX31
2SC2236Y
SWITCH
QX30
RN1401
BUFFER
DX32
TLN105B
DX31
TLN105B
P960
W960A
CONN
FCC 9P
DK30
TLN105B
5.6V
SAT.LED
N.C.
GND
B3 / B4
B1 / B2
SAT. LED
POWER
REMAIN
REC
TIMER
SLP
VCR
CH
SET



IC501	1	2.4	2.4	2.4
	2	2.4	2.4	2.4
	3	2.4	2.4	2.4
	4	2.4	2.4	2.4
	5	4.8	4.8	4.8
	6	1.9	2.8	2.8
	7	1	1	1
	8	4.7	4.7	4.7
	9	1.5	4.7	0
	10	4.7	4.7	4.7
	11	4.9	0	0
	12	4.8	4.8	4.8
	13	4.8	0	0
	14	1.3	1.5	1.5
	15	4.7	4.7	4.7
	16	0	0	0
	17	2	2	2
	18	2.4	2.3	2.3
	19	5.1	5.1	5.1
	20	2.2	2.2	2.2
	21	1.9	1.9	1.9
	22	5.2	5.2	5.2
	23	0	0	0
	24	4.8	4.8	4.8
	25	–	–	–
	26	–	–	–
	27	4.9	4.9	4.9
	28	4.6	0	0
	29	0.8	0.8	0.8
	30	0.4	0.5	0.5
	31	0	0	0
	32	4.9	4.9	4.9
	33	0	0	0
	34	–	–	–
	35	1.2	1.2	1.2
	36	1.5	1.5	1.5
	37	0	0	0
	38	2.2	2.2	2.2
	39	1.9	1.9	1.9
	40	4.8	4.8	4.8
	41	0	0	0
	42	3	0	0
	43	4.9	4.9	4.9
	44	0.8	0.8	0.8
	45	4.9	4.9	4.9
	46	4.8	4.8	0
	47	4.9	4.9	4.9
	48	2.4	2.4	2.3
	49	2.4	2.4	2.4
	50	4.7	4.7	4.5
	51	2.4	2.4	2.4
	52	4.4	4.4	4.4
	53	1.9	2.7	2.6	2.5
	54	2.8	2.8	2.8
	55	4.7	4.7	4.7
	56	4.9	4.9	4.9
	57	2.4	2.3	2.3
	58	2.4	2.4	2.4
	59	4.9	4.9	4.9
	60	2.4	2.4	2.4
	61	2.4	2.4	2.4
	62	2.4	2.4	2.4
	63	2.4	2.4	2.4
	64	2.4	2.4	2.4
	65	2.4	2.4	2.4
	66	2.4	2.4	2.4
	67	2.4	2.4	2.4
	68	2.4	2.4	2.4
	69	2.4	2.4	2.4
	70	2.4	2.4	2.4
	71	2.4	2.4	2.4
	72	2.4	2.4	2.4
	73	2.4	2.4	2.4
	74	2.4	2.4	2.4
	75	2.4	2.4	2.4
	76	2.4	2.4	2.4
	77	2.4	2.4	2.4
	78	2.4	2.4	2.4
	79	2.4	2.4	2.4
	80	2.4	2.4	2.4

VIDEO		MODE		
LOCATION	PIN	EE	PLAY	REC
IC101	1		2.5	2.5
	2		2.3	2.3
	3		2.4	2.5
	4		2.3	0
	5		2.2	2.2
	6		1.3	0.9
	7		2.4	2.4
	8		4.9	4.9
	9		0.8	3.7
	10		0.8	3.7
	11		0	0
	12		0	0
	13		4.4	4.4
	14		0	0
	15		1.2	0
	16		4.8	4.8
	17		4.8	4.8
	18		2.4	2.4
	19		0	4.8
	20		4.9	4.9
	21		0	0
	22		0	0
	23		3.7	3.7
	24		3.7	3.7
	25		1.6	2.1
	26		2.5	2.5
	27		2.4	2.4
	28		4.9	4.9
	29		1.8	1.8
	30		4.9	4.9

VIDEO		MODE
LOCATION	PIN	XDS
IC301	1	0
	2	0
	3	–
	4	4.93
	5	0 TO 5V PULSE
	6	0
	7	1.428
	8	1.456
	9	1.0618
	10	1.183
	11	0
	12	4.92
	13	1.8666
	14	4.92
	15	0 TO 5V PULSE
	16	–
	17	–
	18	–

Fig. 8-2-1

9. PC BOARDS

9-1. Main PC Board (UK01)

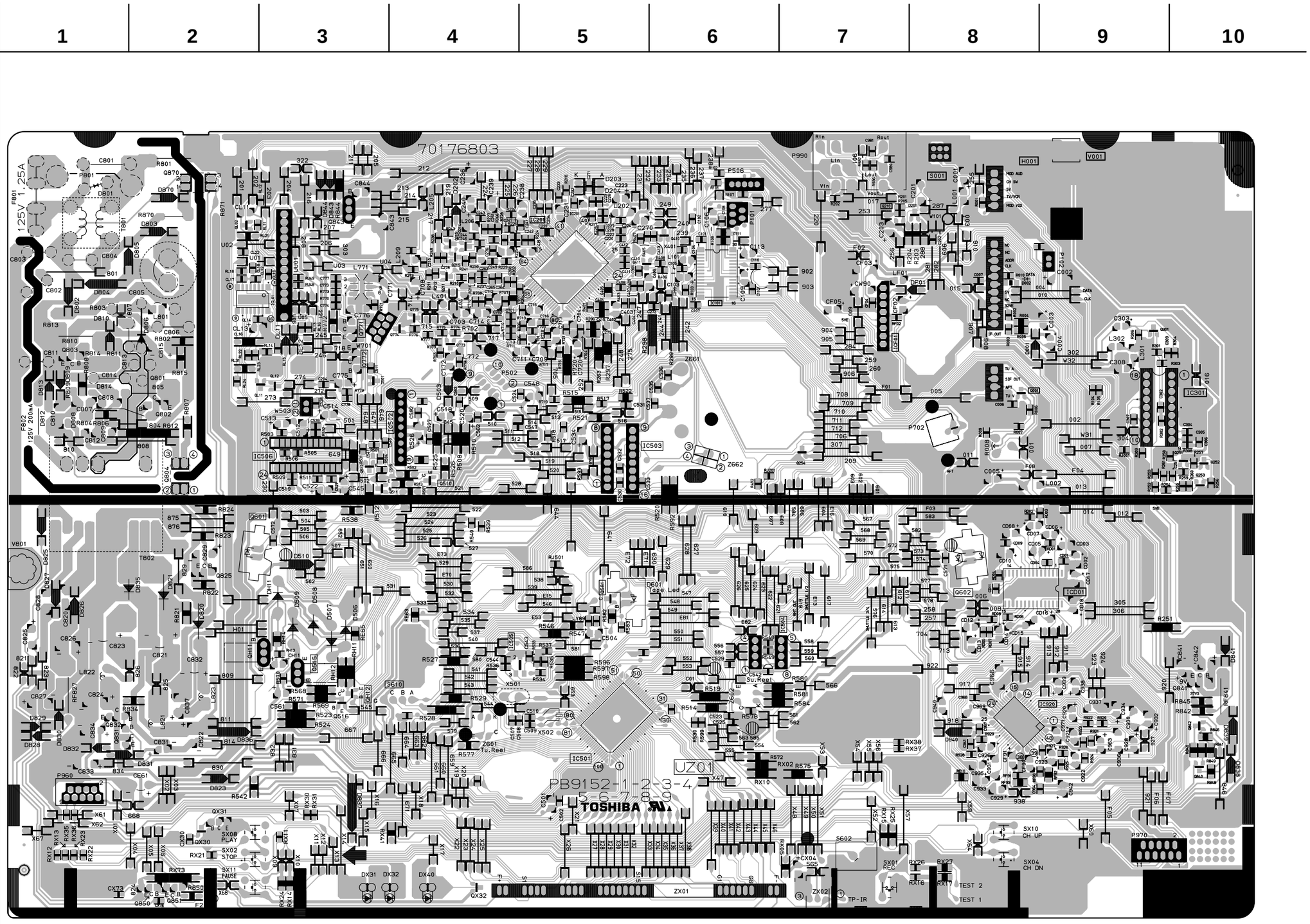


Fig. 9-1-1

9-2. FCB PC Board (UK03)

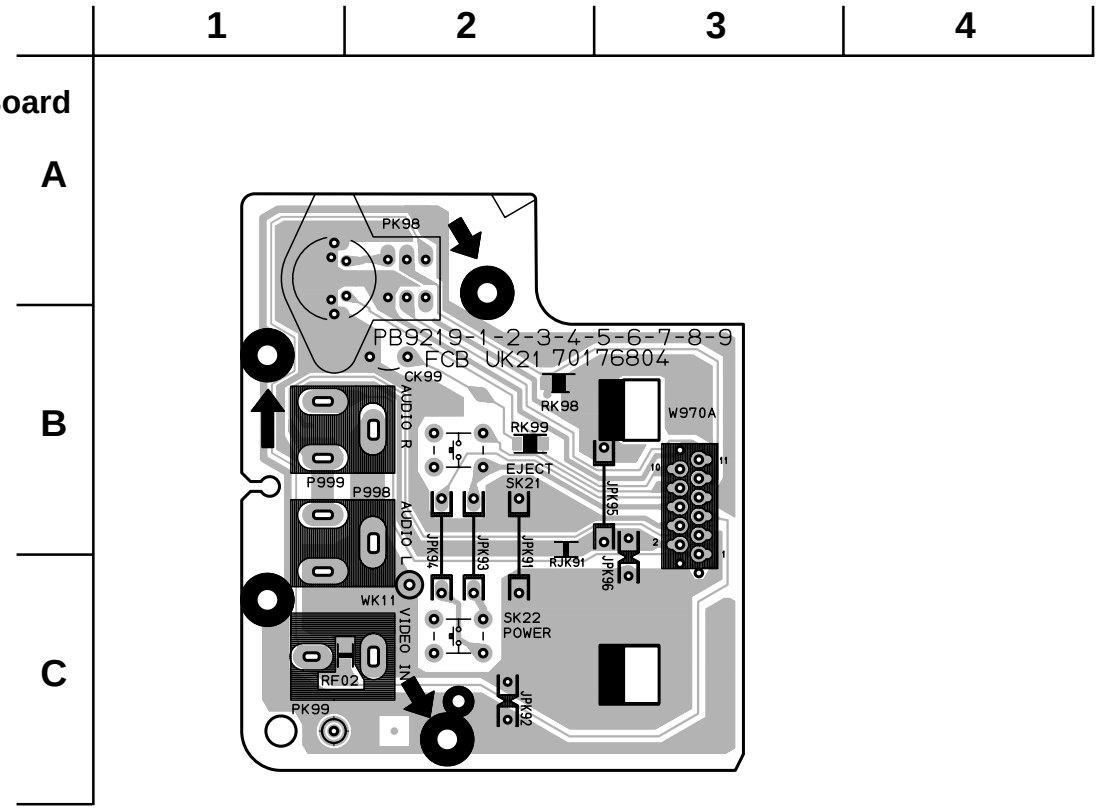


Fig. 9-2-1

9-3. JSB PC Board (UK03)

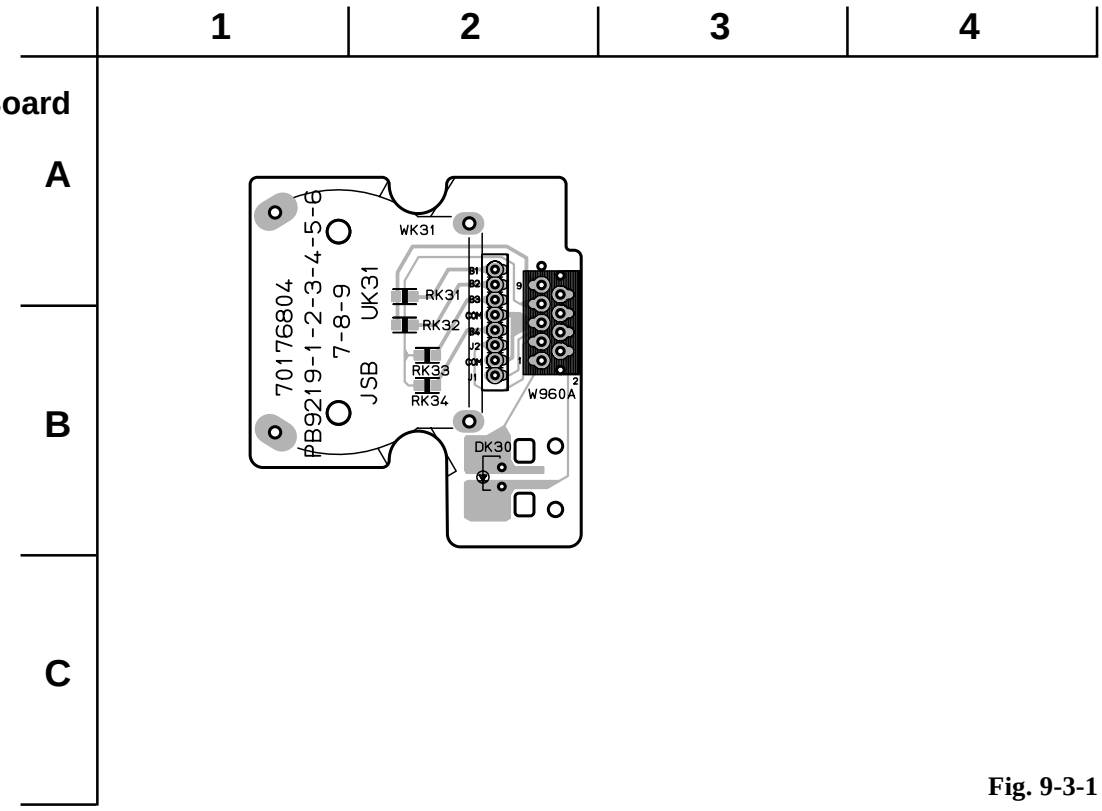


Fig. 9-3-1

SECTION 4
PARTS LIST

1. SAFETY PRECAUTION
2. NOTICE
3. ABBREVIATIONS
3-1. Integrated Circuit (IC)
3-2. Capacitor (Cap)
3-3. Resistor (Res)
4. EXPLODED VIEWS
4-1. Packing Assembly
4-2. Cabinet Assembly
4-3. Chassis Assembly
4-4. Mechanism Assembly (1)
4-5. Mechanism Assembly (2)
5. PARTS LIST

1. SAFETY PRECAUTION

The parts identified by ! (⚠) mark are critical for safety. Replace only with part number specified.
The mounting position of replacement is to be identical with originals.
The substitute replacement parts which do not have the same safety characteristics as specified in the parts list may create shock, fire or other hazards.

2. NOTICE

The part number must be used when ordering parts in order to assist in processing, be sure to include the model number and description.
Parts marked # are of chip type and mounted on original PC boards.
However, when they are placed for servicing works, use discrete parts listed on the parts list.

3. ABBREVIATIONS

3-1. Integrated Circuit (IC)

3-2. Capacitor (Cap)

- **Capacitance Tolerance (for Nominal Capacitance more than 10pF)**

Symbol	B	C	D	F	G	J	K	M	N
Tolerance %	± 0.1	± 0.25	± 0.5	± 1	± 2	± 5	± 10	± 20	± 30

Symbol	P	Q	T	U	V	W	X	Y	Z
Tolerance %	+ 100 0	+ 30 – 10	+ 50 – 10	+ 75 – 10	+ 20 – 10	+ 100 – 10	+ 40 – 20	+ 150 – 10	+ 80 – 20

Ex. 10MF J = 10µF ± 5%

Table 2-1

- **Capacitance Tolerance (for Nominal Capacitance 10pF or less)**

Symbol	B	C	D	F	G
Tolerance pF	± 0.1	± 0.25	± 0.5	± 1	± 2

Ex. 10pF G = 10pF ± 2pF

Table 2-2

3-3. Resistor (Res)

- **Resistance tolerance**

Symbol	B	C	D	F	G	J	K	M
Tolerance %	± 0.1	± 0.25	± 0.5	± 1	± 2	± 5	± 10	± 20

Ex. 470ohm J = 470Ω± 5%

Table 3-1

4. EXPLODED VIEWS

4-1. Packing Assembly

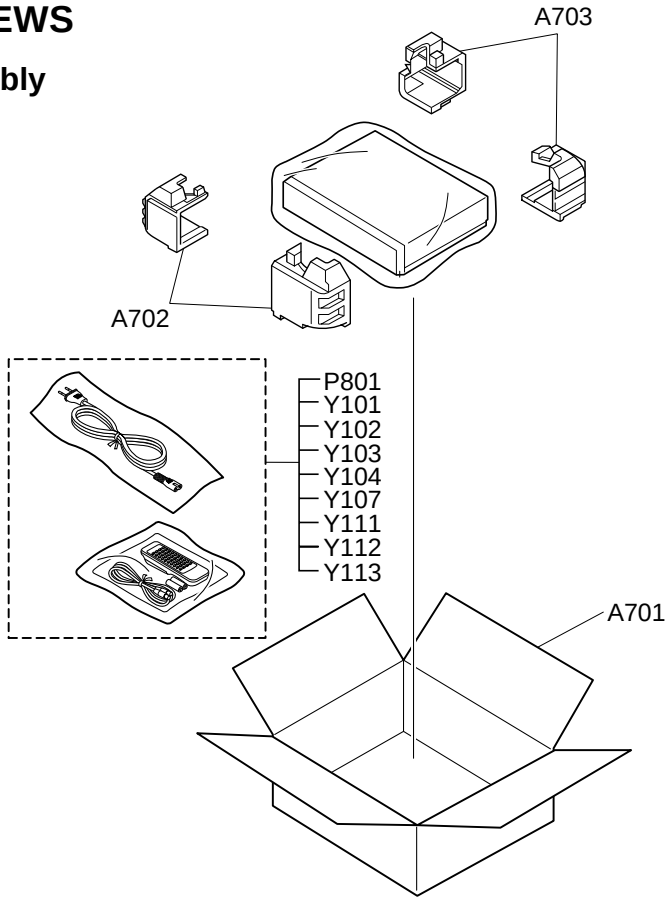


Fig. 4-1-1

4-2. Cabinet Assembly

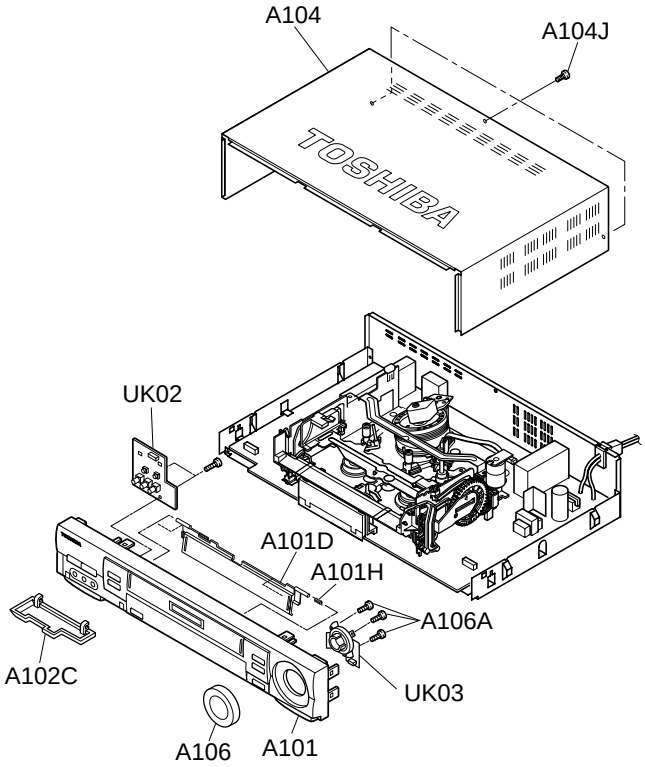


Fig. 4-2-1

4-3. Chassis Assembly

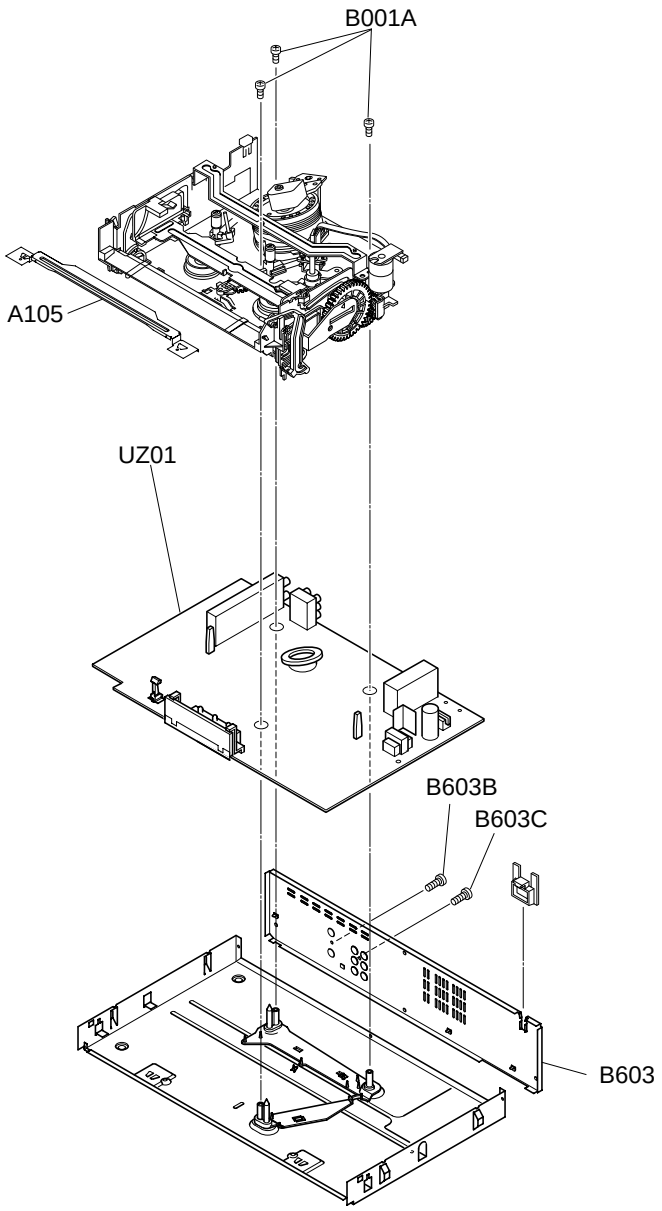


Fig. 4-3-1

4-4. Mechanism Assembly (1)

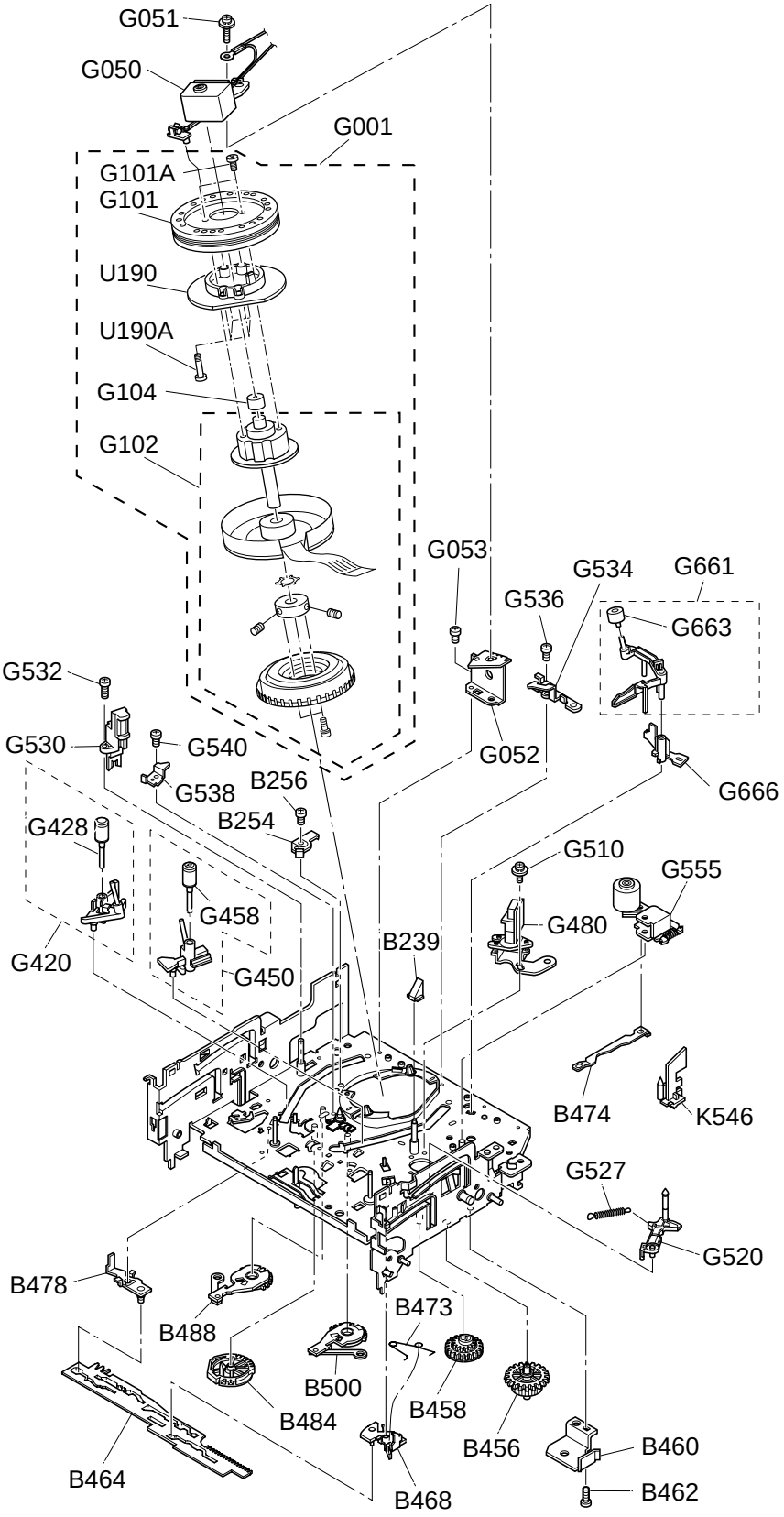


Fig. 4-4-1

4-5. Mechanism Assembly (2)

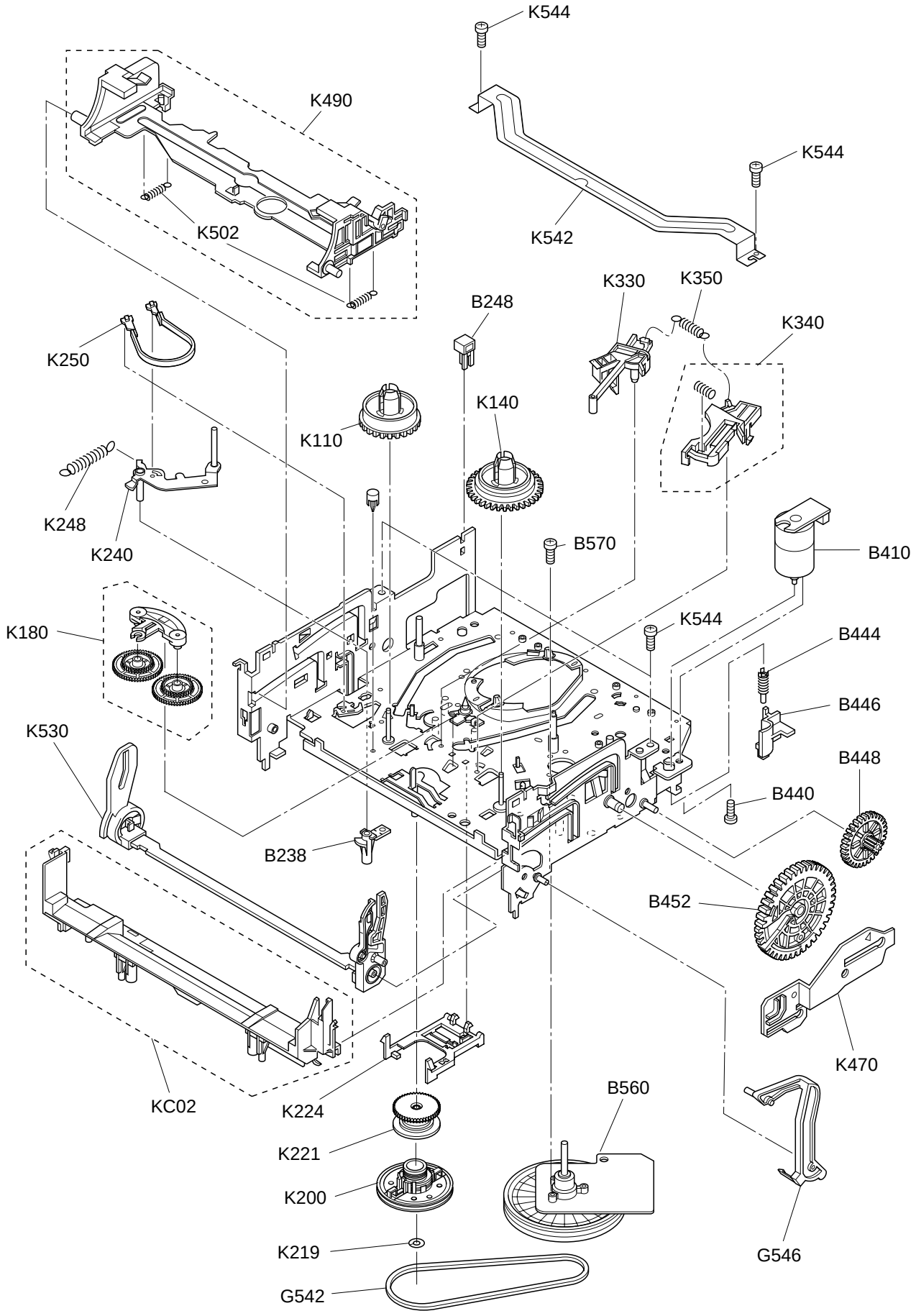


Fig. 4-5-1

5. PARTS LIST

	LOCATION NUMBER	PART NUMBER	DESCRIPTION	
			- MECHANICAL PARTS -	
!	A101	70884800	Front Panel	
	A101D	70896190	Cassette Door	
	A101H	70356358	Spring	
	A102C	70868910	Door	
!	A104	70814541	Top Cover	
	A104J	70391703	Screw	3x6mm
	A105	70896091	Bracket	
	A106	70885253	Knob	
	A106A	70391356	Screw	3x10mm
	A701	70990373	Case	
	A702	70921695	Packing(Front)	
	A703	70921696	Packing(Rear)	
	B001A	70391986	Screw	4x30.5mm
	B238	70379824	Tension Sleeve	
	B239	70368283	No.8 Guide Cap	
	B254	70373470	Plate C	Cylinder
	B256	70391907	Screw	2.6x5mm
	B410	70322542	Loading Motor Assy	
	B438	23164488	Plug	2P
	B440	70391345	Screw	3x3mm
	B444	70333498	Worm Gear	
	B446	70361687	Worm Gear Holder	
	B448	70333497	Worm Wheel Gear	
	B452	70333506	FL Cam Gear	
	B456	70368279	Joint Gear	
	B458	70368291	Joint2 Gear	
	B462	70391907	Screw	2.6x5mm
	B464	70376044	Cam Slider	
	B468	70326764	Pinch Drive Lever	
	B473	70356426	Spring	
	B478	70326751	Tension Drive Lever Assy	
	B484	70333499	Loading Drive Gear	
	B488	70322540	S Loading Lever Assy	
	B500	70322541	T Loading Lever Assy	
	B560	70125774	Capstan Motor Assy	
	B570	70391024	Screw	2.6x6mm
	B603	70884693	Rear Panel	
	B603B	70391703	Screw	3x6mm
	B603C	70391973	Screw	3x12mm
	G001	70311583	Cylinder Assy	
	G050	70125736	Slip Ring Assy	
	G051	23721310	Screw	3x10mm
	G052	70372085	Bracket	
	G101	70311585	Upper Cylinder Assy	
	G104	70368260	Coupling	
	G420	70300455	S Slider Assy	
	G426	70847076	Bush	
	G450	70322537	T Slide Assy	
	G480	70318793	ACE Head Assy	
	G510	70391936	Screw	2.6x5.6mm
	G520	70343273	No.9 Guide Lever Assy	
	G522	70343274	Lever	
	G527	70356416	Spring	
	G530	70183029	FE Head	
	G532	70391910	Screw	2.6x8mm
	G534	70373461	Plate A	Cylinder
	G536	70391907	Screw	2.6x5mm
	G538	70373477	Plate	
	G540	70391907	Screw	2.6x5mm
	G542	70342117	Belt	Reel
	G546	70343264	Door Lever	
	G555	70326756	Pinch Assy	
	G661	70326754	Head Cleaner Assy	
	G663	70326715	Head Cleaner Sub Assy	
	G666	70842952	Head Cleaner Sleeve	
	K110	70331603	S Reel Disk	
	K140	70331604	T Reel Disk	
	K180	70316111	Idle Lever Assy	
	K200	70316109	Clutch Holder Assy	
	K219	70396191	Washer	FI 2.1x5x 0.5mm
	K221	70316110	Center Gear Assy	
	K224	70326767	Up Down Lever Assy	
	K240	70326748	Tension Lever Assy	
	K250	70326753	Band Brake Assy	
	K330	70326765	S Brake Assy	
	K340	70326766	T Brake Assy	
	K350	70356428	Brake Spring	
	K470	70366192	FL Drive Slider	
	K502	70356394	Spring	FL Lever

LOCATION NUMBER	PART NUMBER	DESCRIPTION
K530	70324909	FL Arm Lever Assy
K544	70391847	Screw 2.6x8mm
KC02	70361720	Holder(FL Cassette Guide)
Y101	70971855	Owner's Manual English
Y104	70061209	Sheet(Extended Service Plan)
Y112	70148471	Remote Control Unit
Y113	70168298	RF Cable

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
		- ELECTRICAL PARTS -		
UK02	70185130	PC Board Assy	FCB	
		- RESISTORS -		
RF02	24872750	Res,Chip	75ohm	J 1/16W
RJK91	24000824	Chip Jumper		
		- MISCELLANEOUS -		
P998	70163114	Phono Jack	1P	
P999	70163100	Phono Jack	1P	
PK99	70163113	Phono Jack	1P	
SK21	70145487	Push Switch		
SK22	70145487	Push Switch		
W970A	23902362	FFC	11P,1.25mm	
UK03	70185146	PC Board Assy	JSB	
		- DIODES -		
DK30	70118324	Diode,LED	TLN105B	
		- RESISTORS -		
RK31	24872302	Res,Chip	3kohm	J 1/16W
RK32	24872472	Res,Chip	4.7kohm	J 1/16W
RK33	24872302	Res,Chip	3kohm	J 1/16W
RK34	24872472	Res,Chip	4.7kohm	J 1/16W
		- MISCELLANEOUS -		
W960	70179820	FFC	9P	
W960A	23902360	Connecter,FFC 9P		
WK31	70145518	Shuttle Switch	SRGPQJ300	
UZ01	70185117	PC Board Assy	Main	
		- INTEGRATED CIRCUITS -		
IC101	70200356	IC	TA8894BF	
IC201	70200794	IC	TA1251CF(DRY	
IC301	70200682	IC	Z86131	
IC501	70200198	IC	TMP93CU76F-1A84	
IC502	B0320665	IC	TA7291S	
IC503	B0101220	IC	TB6515AP	
IC504	70011807	IC	ST24C02AB1	
IC505	70200729	IC	PST7025MT	
IC506	70200673	IC	LA7116	
IC825	23318653	IC	UPC1093J	
IC920	70200603	IC	TA1246AF(DRY	
ICD01	70200745	IC	UPC1854AGT	
ICF01	70200702	IC	MM1113XS	
ICL01	70200087	IC	TC90A25F-412	
! Q804	23904054	IC	ON3131-R	
! Q870	23904054	IC	ON3131-R	
		- TRANSISTORS -		
Q001	A6335470	Transistor,Chip	2SC2712-Y	
Q210	A6548370	Transistor,Chip	2SA1362-GR	
Q211	A6335470	Transistor,Chip	2SC2712-Y	
Q251	A6335470	Transistor,Chip	2SC2712-Y	
Q252	A6335470	Transistor,Chip	2SC2712-Y	
Q254	A6004040	Transistor,Chip	RN1404	
Q301	A6335470	Transistor,Chip	2SC2712-Y	
Q410	A6335470	Transistor,Chip	2SC2712-Y	
Q411	A6541130	Transistor,Chip	2SA1162-Y	
Q510	A6004040	Transistor,Chip	RN1404	
Q511	A6541130	Transistor,Chip	2SA1162-Y	
Q512	A6541130	Transistor,Chip	2SA1162-Y	
Q515	A6534145	Transistor	2SA1020-Y	
Q516	A6004020	Transistor,Chip	RN1402	
Q581	A6335470	Transistor,Chip	2SC2712-Y	
Q601	70114403	Transistor,Photo	PT493F	
Q602	70114403	Transistor,Photo	PT493F	
Q771	A6319300	Transistor	2SC1959-Y	
Q772	A6332430	Transistor	2SC2458-Y	
Q773	A6014030	Transistor,Chip	RN2403	
Q774	A6335470	Transistor,Chip	2SC2712-Y	
Q775	A6335470	Transistor,Chip	2SC2712-Y	
Q801	70114442	Transistor,FET	2SK2793	
Q802	A6332430	Transistor	2SC2458-Y	
Q803	A6332430	Transistor	2SC2458-Y	
Q831	A6325549	Transistor	2SC2236-Y	
Q832	A6325549	Transistor	2SC2236-Y	
Q840	A6541130	Transistor,Chip	2SA1162-Y	
Q841	A6325549	Transistor	2SC2236-Y	
Q842	A6335470	Transistor,Chip	2SC2712-Y	
Q843	A6325549	Transistor	2SC2236-Y	
QH11	A6534145	Transistor	2SA1020-Y	
QH12	A6004020	Transistor,Chip	RN1402	
QL02	A6541130	Transistor,Chip	2SA1162-Y	

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
QL11	A6014040	Transistor,Chip	RN2404	
QL12	A6004040	Transistor,Chip	RN1404	
QX30	A6004010	Transistor,Chip	RN1401	
QX31	A6325549	Transistor	2SC2236-Y	
		- DIODES -		
D001	23316753	Diode,Zener	MTZJ33A	
D501	A7152750	Diode,Chip	1SS226	
D503	23115537	Diode	1SS131	
D506	23118486	Diode	ERA15-02	
D507	23118486	Diode	ERA15-02	
D508	23118486	Diode	ERA15-02	
D509	23118486	Diode	ERA15-02	
D510	23118486	Diode	ERA15-02	
D601	70115450	Diode,LED	GL451V	
D802	23118486	Diode	ERA15-02	
D803	23118486	Diode	ERA15-02	
D804	23118486	Diode	ERA15-02	
D805	23118486	Diode	ERA15-02	
D806	23316381	Diode	RU1P	
D808	23316765	Diode	1SS136	
D809	23118056	Diode	AG01	
D810	23316727	Diode,Zener	MTZJ16A	
D812	23118486	Diode	ERA15-02	
D813	23316668	Diode,Zener	MTZJ5.1A	
D814	23316765	Diode	1SS136	
D820	23316399	Diode	EL1Z	
D821	23316766	Diode	RU2YX	
D823	23118486	Diode	ERA15-02	
D825	23118056	Diode	AG01	
D826	23118056	Diode	AG01	
D827	23118056	Diode	AG01	
D828	23316654	Diode,Zener	MTZJ3.0A	
D829	23316716	Diode,Zener	MTZJ11B	
D830	23316719	Diode,Zener	MTZJ12B	
D831	23316668	Diode,Zener	MTZJ5.1A	
D832	23115537	Diode	1SS131	
D835	23316463	Diode	RK46	
D836	23118486	Diode	ERA15-02	
D837	23118486	Diode	ERA15-02	
D838	23118486	Diode	ERA15-02	
D839	23118486	Diode	ERA15-02	
D841	23316690	Diode,Zener	MTZJ10B	
D843	23316673	Diode,Zener	MTZJ5.6C	
D870	23118486	Diode	ERA15-02	
D940	23115537	Diode	1SS131	
DH11	23118486	Diode	ERA15-02	
DL11	23115537	Diode	1SS131	
DL12	23115537	Diode	1SS131	
DX31	70118324	Diode,LED	TLN105B	
DX32	70118324	Diode,LED	TLN105B	
		- COILS -		
L001	23289479	Coil,Peaking	TRF44R7AF	
L002	23289100	Coil,Peaking	TRF4100AF	
L101	23289180	Coil,Peaking	TRF4180F	
L202	23289109	Coil,Peaking	TRF41R0AF	
L206	23289470	Coil,Peaking	TRF4470AF	
L207	23289680	Coil,Peaking	TRF4680AF	
L208	23289680	Coil,Peaking	TRF4680AF	
L209	23289220	Coil,Peaking	TRF4220AF	
L301	23289330	Coil,Peaking	TRF4330AF	
L302	23289100	Coil,Peaking	TRF4100AF	
L701	23237729	Coil,Peaking	TRF4822AP	
L771	23224368	Coil,Osc	70kHz	
L772	23289331	Coil,Peaking	TRF4331AF	
L801	70131060	Filter	ZBF253D-00F	
L821	70211099	Coil	SL0609	
L822	70211099	Coil	SL0609	
L823	70211099	Coil	SL0609	
LF01	23289100	Coil,Peaking	TRF4100AF	
LY89	70261024	Filter	BLM21A10PT	
		- CAPACITORS -		
C001	24630025	Cap,Electrolytic	10MF	M 50V
C002	24630025	Cap,Electrolytic	10MF	M 50V
C003	24630023	Cap,Electrolytic	4.7MF	M 16V
C004	24797470	Cap,Electrolytic	47MF	M 50V
C005	24090077	Cap,OS	10MF	M 16V
C006	24815223	Cap,Chip	0.022MF	K 50V
C101	24814103	Cap,Chip	0.01MF	Z 50V
C102	24814103	Cap,Chip	0.01MF	Z 50V
C103	24630033	Cap,Electrolytic	0.47MF	M 50V
C104	24781180	Cap,Chip	18pF	J 50V
C106	24630025	Cap,Electrolytic	10MF	M 50V

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
C107	24815103	Cap,Chip	0.01MF	K 50V
C108	24092178	Cap,Chip	0.1MF	K 25V
C109	24630034	Cap,Electrolytic	1MF	M 50V
C110	24814103	Cap,Chip	0.01MF	Z 50V
C111	24287104	Cap,Chip	0.1MF	Z 50V
C113	24630850	Cap,Electrolytic	47MF	M 16V
C201	24792471	Cap,Electrolytic	470MF	M 6.3V
C202	24814103	Cap,Chip	0.01MF	Z 50V
C203	24630850	Cap,Electrolytic	47MF	M 16V
C204	24814103	Cap,Chip	0.01MF	Z 50V
C210	24781270	Cap,Chip	27pF	J 50V
C220	24814103	Cap,Chip	0.01MF	Z 50V
C222	24815103	Cap,Chip	0.01MF	K 50V
C224	24092293	Cap,Chip	0.1MF	Z 25V
C225	24092293	Cap,Chip	0.1MF	Z 25V
C226	24814103	Cap,Chip	0.01MF	Z 50V
C227	24815103	Cap,Chip	0.01MF	K 50V
C228	24815472	Cap,Chip	4700pF	K 50V
C229	24815103	Cap,Chip	0.01MF	K 50V
C230	24797229	Cap,Electrolytic	2.2MF	M 50V
C231	24797229	Cap,Electrolytic	2.2MF	M 50V
C232	24781680	Cap,Chip	68pF	J 50V
C233	24815103	Cap,Chip	0.01MF	K 50V
C234	24781102	Cap,Chip	1000pF	J 50V
C235	24092293	Cap,Chip	0.1MF	Z 25V
C236	24630850	Cap,Electrolytic	47MF	M 16V
C237	24287224	Cap,Chip	0.22MF	Z 50V
C238	24630035	Cap,Electrolytic	2.2MF	M 50V
C240	24794100	Cap,Electrolytic	10MF	M 16V
C241	24092178	Cap,Chip	0.1MF	K 25V
C242	24781090	Cap,Chip	9pF	D 50V
C243	24781621	Cap,Chip	620pF	J 50V
C244	24781300	Cap,Chip	30pF	J 50V
C245	24781201	Cap,Chip	200pF	J 50V
C247	24092178	Cap,Chip	0.1MF	K 25V
C248	24630034	Cap,Electrolytic	1MF	M 50V
C249	24781560	Cap,Chip	56pF	J 50V
C263	24814103	Cap,Chip	0.01MF	Z 50V
C264	24781221	Cap,Chip	220pF	J 50V
C265	24781241	Cap,Chip	240pF	J 50V
C268	24092178	Cap,Chip	0.1MF	K 25V
C270	24797010	Cap,Electrolytic	1MF	M 10V
C271	24092178	Cap,Chip	0.1MF	K 25V
C273	24815103	Cap,Chip	0.01MF	K 50V
C276	24781150	Cap,Chip	15pF	J 50V
C278	24814103	Cap,Chip	0.01MF	Z 50V
C299	24815103	Cap,Chip	0.01MF	K 50V
C301	24814103	Cap,Chip	0.01MF	Z 50V
C302	24092178	Cap,Chip	0.1MF	K 25V
C303	24630023	Cap,Electrolytic	4.7MF	M 16V
C304	24092178	Cap,Chip	0.1MF	K 25V
C305	24815682	Cap,Chip	6800pF	K 50V
C306	24814333	Cap,Chip	0.033MF	Z 50V
C307	24092178	Cap,Chip	0.1MF	K 25V
C308	24630030	Cap,Electrolytic	0.1MF	M 50V
C309	24092441	Cap,Chip	1MF	Z 16V
C401	24276102	Cap,Chip	1000pF	J 50V
C402	24630025	Cap,Electrolytic	10MF	M 50V
C403	24630033	Cap,Electrolytic	0.47MF	M 50V
C404	24815332	Cap,Chip	3300pF	K 50V
C405	24287104	Cap,Chip	0.1MF	Z 50V
C406	24630866	Cap,Electrolytic	47MF	M 6.3V
C408	24814103	Cap,Chip	0.01MF	Z 50V
C409	24815682	Cap,Chip	6800pF	K 50V
C410	24815682	Cap,Chip	6800pF	K 50V
C411	24092178	Cap,Chip	0.1MF	K 25V
C412	24814103	Cap,Chip	0.01MF	Z 50V
C413	24781330	Cap,Chip	33pF	J 50V
C415	24287104	Cap,Chip	0.1MF	Z 50V
C501	24630864	Cap,Electrolytic	100MF	M 6.3V
C504	24630866	Cap,Electrolytic	47MF	M 6.3V
C507	24774080	Cap,Chip	8pF	D 50V
C508	24774080	Cap,Chip	8pF	D 50V
C509	24774180	Cap,Chip	18pF	J 50V
C510	24774150	Cap,Chip	15pF	J 50V
C511	24815102	Cap,Chip	1000pF	K 50V
C512	24794470	Cap,Electrolytic	47MF	M 16V
C513	24794470	Cap,Electrolytic	47MF	M 16V
C514	24794470	Cap,Electrolytic	47MF	M 16V
C515	24781331	Cap,Chip	330pF	J 50V
C518	24630034	Cap,Electrolytic	1MF	M 50V
C519	24781101	Cap,Chip	100pF	J 50V

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
C520	24630034	Cap,Electrolytic	1MF	M 50V
C521	24781101	Cap,Chip	100pF	J 50V
C522	24794470	Cap,Electrolytic	47MF	M 16V
C523	24815102	Cap,Chip	1000pF	K 50V
C524	24815102	Cap,Chip	1000pF	K 50V
C525	24092178	Cap,Chip	0.1MF	K 25V
C527	24815103	Cap,Chip	0.01MF	K 50V
C528	24815103	Cap,Chip	0.01MF	K 50V
C529	24815103	Cap,Chip	0.01MF	K 50V
C530	24815103	Cap,Chip	0.01MF	K 50V
C531	24092178	Cap,Chip	0.1MF	K 25V
C532	24092178	Cap,Chip	0.1MF	K 25V
C533	24092178	Cap,Chip	0.1MF	K 25V
C534	24630846	Cap,Electrolytic	10MF	M 25V
C535	24815103	Cap,Chip	0.01MF	K 50V
C536	24815103	Cap,Chip	0.01MF	K 50V
C537	24815103	Cap,Chip	0.01MF	K 50V
C539	24781121	Cap,Chip	120pF	J 50V
C540	24781121	Cap,Chip	120pF	J 50V
C542	24815103	Cap,Chip	0.01MF	K 50V
C543	24092178	Cap,Chip	0.1MF	K 25V
C544	24815103	Cap,Chip	0.01MF	K 50V
C545	24794470	Cap,Electrolytic	47MF	M 16V
C547	24815103	Cap,Chip	0.01MF	K 50V
C548	24796220	Cap,Electrolytic	22MF	M 35V
C561	24630866	Cap,Electrolytic	47MF	M 6.3V
C571	24814103	Cap,Chip	0.01MF	Z 50V
C572	24814103	Cap,Chip	0.01MF	Z 50V
C592	24815103	Cap,Chip	0.01MF	K 50V
C701	24815561	Cap,Chip	560pF	K 50V
C702	24794100	Cap,Electrolytic	10MF	M 16V
C704	24794220	Cap,Electrolytic	22MF	M 16V
C706	24815562	Cap,Chip	5600pF	K 50V
C707	24287104	Cap,Chip	0.1MF	Z 50V
C709	24794220	Cap,Electrolytic	22MF	M 16V
C710	24781561	Cap,Chip	560pF	J 50V
C711	24796479	Cap,Electrolytic	4.7MF	M 35V
C712	24815332	Cap,Chip	3300pF	K 50V
C713	24815103	Cap,Chip	0.01MF	K 50V
C714	24794100	Cap,Electrolytic	10MF	M 16V
C715	24797010	Cap,Electrolytic	1MF	M 10V
C716	24815333	Cap,Chip	0.033MF	K 50V
C717	24797010	Cap,Electrolytic	1MF	M 10V
C771	24082049	Cap,Plastic	0.047MF	J 100V
C772	24794470	Cap,Electrolytic	47MF	M 16V
C773	24815103	Cap,Chip	0.01MF	K 50V
C774	24815103	Cap,Chip	0.01MF	K 50V
C775	24794330	Cap,Electrolytic	33MF	M 16V
C776	24214221	Cap,Ceramic	220pF	K 500V
C777	24815103	Cap,Chip	0.01MF	K 50V
! C801	24082926	Cap,Plastic	0.1MF	M AC275
! C802	24092581	Cap,Ceramic	1000pF	M AC250
! C803	24092581	Cap,Ceramic	1000pF	M AC250
! C804	24092584	Cap,Ceramic	3300pF	M AC250
C805	70213241	Cap,Electrolytic	220MF	M 220V
C806	24082081	Cap,Plastic	0.033MF	M 630V
C807	24591473	Cap,Plastic	0.047MF	J 50V
C808	24591123	Cap,Plastic	0.012MF	J 50V
C809	24591273	Cap,Plastic	0.027MF	J 50V
C810	24567124	Cap,Plastic	0.12MF	J 50V
! C811	24092581	Cap,Ceramic	1000pF	M AC250
C812	24591561	Cap,Plastic	560pF	J 50V
C813	24215181	Cap,Ceramic	180pF	K 1kV
C815	24678229	Cap,Electrolytic	2.2MF	M 200V
C820	24214102	Cap,Ceramic	1000pF	K 500V
C821	70415180	Cap,Electrolytic	820MF	M 25V
C822	24667221	Cap,Electrolytic	220MF	M 25V
C823	70430003	Cap,Electrolytic	1200MF	10V
C824	24665221	Cap,Electrolytic	220MF	M 10V
C825	70430004	Cap,Electrolytic	220MF	
C826	70430006	Cap,Electrolytic	100MF	
C827	70430005	Cap,Electrolytic	33MF	
C828	24214102	Cap,Ceramic	1000pF	K 500V
C829	24668100	Cap,Electrolytic	10MF	M 35V
C831	24665220	Cap,Electrolytic	22MF	M 10V
C832	70430007	Cap,Electrolytic	470MF	
C837	24668101	Cap,Electrolytic	100MF	M 35V
C841	24794220	Cap,Electrolytic	22MF	M 16V
C842	24794220	Cap,Electrolytic	22MF	M 16V
C843	24793220	Cap,Electrolytic	22MF	M 10V
C844	24793220	Cap,Electrolytic	22MF	M 10V
C920	24797478	Cap,Electrolytic	0.47MF	M 50V

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
C921	24797478	Cap,Electrolytic	0.47MF	M 50V
C922	24797010	Cap,Electrolytic	1MF	M 10V
C923	24797010	Cap,Electrolytic	1MF	M 10V
C926	24797478	Cap,Electrolytic	0.47MF	M 50V
C928	24794100	Cap,Electrolytic	10MF	M 16V
C929	24794100	Cap,Electrolytic	10MF	M 16V
C930	24591103	Cap,Plastic	0.01MF	J 50V
C931	24591103	Cap,Plastic	0.01MF	J 50V
C932	24794100	Cap,Electrolytic	10MF	M 16V
C933	24794100	Cap,Electrolytic	10MF	M 16V
C934	24794100	Cap,Electrolytic	10MF	M 16V
C935	24794100	Cap,Electrolytic	10MF	M 16V
C936	24591103	Cap,Plastic	0.01MF	J 50V
C937	24591103	Cap,Plastic	0.01MF	J 50V
C938	24794220	Cap,Electrolytic	22MF	M 16V
C939	24794220	Cap,Electrolytic	22MF	M 16V
C940	24630025	Cap,Electrolytic	10MF	M 50V
C941	24815331	Cap,Chip	330pF	K 50V
C942	24794101	Cap,Electrolytic	100MF	M 16V
C963	24792331	Cap,Electrolytic	330MF	M 6.3V
C964	24092293	Cap,Chip	0.1MF	Z 25V
C966	24794101	Cap,Electrolytic	100MF	M 16V
C967	24815563	Cap,Chip	0.056MF	K 50V
C968	24092293	Cap,Chip	0.1MF	Z 25V
C969	24591103	Cap,Plastic	0.01MF	J 50V
C971	24794220	Cap,Electrolytic	22MF	M 16V
C980	24815332	Cap,Chip	3300pF	K 50V
C981	24815332	Cap,Chip	3300pF	K 50V
CD01	24815103	Cap,Chip	0.01MF	K 50V
CD02	24630850	Cap,Electrolytic	47MF	M 16V
CD03	24630852	Cap,Electrolytic	22MF	M 16V
CD04	24092178	Cap,Chip	0.1MF	K 25V
CD05	24630034	Cap,Electrolytic	1MF	M 50V
CD06	24630023	Cap,Electrolytic	4.7MF	M 16V
CD07	24630035	Cap,Electrolytic	2.2MF	M 50V
CD08	24630030	Cap,Electrolytic	0.1MF	M 50V
CD09	24815473	Cap,Chip	0.047MF	K 50V
CD10	24630033	Cap,Electrolytic	0.47MF	M 50V
CD11	24092178	Cap,Chip	0.1MF	K 25V
CD12	24630034	Cap,Electrolytic	1MF	M 50V
CD13	24630034	Cap,Electrolytic	1MF	M 50V
CD14	24630034	Cap,Electrolytic	1MF	M 50V
CD15	70415176	Cap,Electrolytic	3.3MF	F 16V
CD16	70415177	Cap,Electrolytic	10MF	F 16V
CD17	24630034	Cap,Electrolytic	1MF	M 50V
CD18	24630034	Cap,Electrolytic	1MF	M 50V
CE61	70430002	Cap,Electrolytic	1000MF	
CF02	24794100	Cap,Electrolytic	10MF	M 16V
CF04	24814103	Cap,Chip	0.01MF	Z 50V
CF05	24630025	Cap,Electrolytic	10MF	M 50V
CF90	24797010	Cap,Electrolytic	1MF	M 10V
CF91	24797010	Cap,Electrolytic	1MF	M 10V
CH11	24630866	Cap,Electrolytic	47MF	M 6.3V
CL12	24814103	Cap,Chip	0.01MF	Z 50V
CL14	24814103	Cap,Chip	0.01MF	Z 50V
CL16	24474102	Cap,Ceramic	1000pF	K 50V
CL17	24781181	Cap,Chip	180pF	J 50V
CL18	24815103	Cap,Chip	0.01MF	K 50V
CL22	24814103	Cap,Chip	0.01MF	Z 50V
CW90	24630025	Cap,Electrolytic	10MF	M 50V
CX04	24630866	Cap,Electrolytic	47MF	M 6.3V
CX30	24774820	Cap,Chip	82pF	J 50V
CX73	24815473	Cap,Chip	0.047MF	K 50V
CX74	24815473	Cap,Chip	0.047MF	K 50V
		- RESISTORS -		
R001	24000573	Res,Chip	1kohm	F 1/16W
R002	24872102	Res,Chip	1kohm	J 1/16W
R003	24872273	Res,Chip	27kohm	J 1/16W
R004	24871681	Res,Chip	680ohm	J 1/8W
R006	24000824	Chip Jumper		
R007	24872103	Res,Chip	10kohm	J 1/16W
R010	24000824	Chip Jumper		
R101	24872101	Res,Chip	100ohm	J 1/16W
R102	24872102	Res,Chip	1kohm	J 1/16W
R103	24872394	Res,Chip	390kohm	J 1/16W
R104	24872220	Res,Chip	22ohm	J 1/16W
R105	24872220	Res,Chip	22ohm	J 1/16W
R107	24872102	Res,Chip	1kohm	J 1/16W
R108	24019161	Res,Chip	9.1kohm	F 1/8W
R201	24872750	Res,Chip	75ohm	J 1/16W
R202	24872750	Res,Chip	75ohm	J 1/16W
R203	24366681	Res,Carbon	680ohm	J 1/6W

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
R204	24366681	Res,Carbon	680ohm	J 1/6W
R205	24872101	Res,Chip	100ohm	J 1/16W
R210	24872102	Res,Chip	1kohm	J 1/16W
R211	24872152	Res,Chip	1.5kohm	J 1/16W
R212	24872101	Res,Chip	100ohm	J 1/16W
R213	24872102	Res,Chip	1kohm	J 1/16W
R217	24872821	Res,Chip	820ohm	J 1/16W
R224	24872512	Res,Chip	5.1kohm	J 1/16W
R225	24872122	Res,Chip	1.2kohm	J 1/16W
R226	24872152	Res,Chip	1.5kohm	J 1/16W
R227	24872511	Res,Chip	510ohm	J 1/16W
R228	24872681	Res,Chip	680ohm	J 1/16W
R229	24872511	Res,Chip	510ohm	J 1/16W
R230	24000824	Chip Jumper		
R232	24872225	Res,Chip	2.2Mohm	J 1/16W
R237	24872102	Res,Chip	1kohm	J 1/16W
R241	24872222	Res,Chip	2.2kohm	J 1/16W
R248	24872101	Res,Chip	100ohm	J 1/16W
R252	24872203	Res,Chip	20kohm	J 1/16W
R253	24872203	Res,Chip	20kohm	J 1/16W
R255	24000824	Chip Jumper		
R256	24872202	Res,Chip	2kohm	J 1/16W
R257	24872512	Res,Chip	5.1kohm	J 1/16W
R258	24872151	Res,Chip	150ohm	J 1/16W
R259	24872132	Res,Chip	1.3kohm	J 1/16W
R260	24000824	Chip Jumper		
R262	24000824	Chip Jumper		
R296	24871103	Res,Chip	10kohm	J 1/8W
R297	24366472	Res,Carbon	4.7kohm	J 1/6W
R298	70424099	Res,Carbon	470ohm	J 1/6W
R299	70424099	Res,Carbon	470ohm	J 1/6W
R301	24872102	Res,Chip	1kohm	J 1/16W
R302	24872471	Res,Chip	470ohm	J 1/16W
R303	24872471	Res,Chip	470ohm	J 1/16W
R304	24872223	Res,Chip	22kohm	J 1/16W
R306	24872223	Res,Chip	22kohm	J 1/16W
R308	24872682	Res,Chip	6.8kohm	J 1/16W
R309	24872103	Res,Chip	10kohm	J 1/16W
R401	24872153	Res,Chip	15kohm	J 1/16W
R402	24872273	Res,Chip	27kohm	J 1/16W
R403	24872273	Res,Chip	27kohm	J 1/16W
R405	24872222	Res,Chip	2.2kohm	J 1/16W
R406	24872102	Res,Chip	1kohm	J 1/16W
R407	24872101	Res,Chip	100ohm	J 1/16W
R408	24872102	Res,Chip	1kohm	J 1/16W
R501	24872103	Res,Chip	10kohm	J 1/16W
R502	24366821	Res,Carbon	820ohm	J 1/6W
R503	24872471	Res,Chip	470ohm	J 1/16W
R504	24872224	Res,Chip	220kohm	J 1/16W
R505	24872474	Res,Chip	470kohm	J 1/16W
R506	24872222	Res,Chip	2.2kohm	J 1/16W
R507	24366472	Res,Carbon	4.7kohm	J 1/6W
R508	24366182	Res,Carbon	1.8kohm	J 1/6W
R509	24872563	Res,Chip	56kohm	J 1/16W
R510	24366182	Res,Carbon	1.8kohm	J 1/6W
R511	24872563	Res,Chip	56kohm	J 1/16W
R512	24366224	Res,Carbon	220kohm	J 1/6W
R513	24366224	Res,Carbon	220kohm	J 1/6W
R514	24366473	Res,Carbon	47kohm	J 1/6W
R515	24366473	Res,Carbon	47kohm	J 1/6W
R517	24872103	Res,Chip	10kohm	J 1/16W
R518	24872163	Res,Chip	16kohm	J 1/16W
R519	24366563	Res,Carbon	56kohm	J 1/6W
R520	24366563	Res,Carbon	56kohm	J 1/6W
R521	24366109	Res,Carbon	1ohm	J 1/6W
R522	24871201	Res,Chip	200ohm	J 1/8W
R523	24366472	Res,Carbon	4.7kohm	J 1/6W
R524	24366472	Res,Carbon	4.7kohm	J 1/6W
R525	24366103	Res,Carbon	10kohm	J 1/6W
R526	24366103	Res,Carbon	10kohm	J 1/6W
R527	24366222	Res,Carbon	2.2kohm	J 1/6W
R528	24366222	Res,Carbon	2.2kohm	J 1/6W
R529	24366222	Res,Carbon	2.2kohm	J 1/6W
R530	24872472	Res,Chip	4.7kohm	J 1/16W
R531	24366472	Res,Carbon	4.7kohm	J 1/6W
R532	24872472	Res,Chip	4.7kohm	J 1/16W
R533	24872223	Res,Chip	22kohm	J 1/16W
R534	24872303	Res,Chip	30kohm	J 1/16W
R535	24872473	Res,Chip	47kohm	J 1/16W
R536	24872102	Res,Chip	1kohm	J 1/16W
R537	24872103	Res,Chip	10kohm	J 1/16W
R538	24366103	Res,Carbon	10kohm	J 1/6W

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
R539	24872103	Res,Chip	10kohm	J 1/16W
R540	24872103	Res,Chip	10kohm	J 1/16W
R546	24366102	Res,Carbon	1kohm	J 1/6W
R547	24366102	Res,Carbon	1kohm	J 1/6W
R548	24872472	Res,Chip	4.7kohm	J 1/16W
R549	24872472	Res,Chip	4.7kohm	J 1/16W
R563	24366912	Res,Carbon	9.1kohm	J 1/6W
R568	24366222	Res,Carbon	2.2kohm	J 1/6W
R569	24366222	Res,Carbon	2.2kohm	J 1/6W
R570	24872103	Res,Chip	10kohm	J 1/16W
R571	24366303	Res,Carbon	30kohm	J 1/6W
R572	24366223	Res,Carbon	22kohm	J 1/6W
R575	24366472	Res,Carbon	4.7kohm	J 1/6W
R577	24366223	Res,Carbon	22kohm	J 1/6W
R578	24872223	Res,Chip	22kohm	J 1/16W
R580	24366102	Res,Carbon	1kohm	J 1/6W
R581	24366102	Res,Carbon	1kohm	J 1/6W
R582	24871151	Res,Chip	150ohm	J 1/8W
R583	24872102	Res,Chip	1kohm	J 1/16W
R584	24366102	Res,Carbon	1kohm	J 1/6W
R592	24366472	Res,Carbon	4.7kohm	J 1/6W
R593	24872472	Res,Chip	4.7kohm	J 1/16W
R596	24366103	Res,Carbon	10kohm	J 1/6W
R597	24366103	Res,Carbon	10kohm	J 1/6W
R598	24366103	Res,Carbon	10kohm	J 1/6W
R599	24872222	Res,Chip	2.2kohm	J 1/16W
R702	24366102	Res,Carbon	1kohm	J 1/6W
R703	24872243	Res,Chip	24kohm	J 1/16W
R704	24872105	Res,Chip	1Mohm	J 1/16W
R705	24872331	Res,Chip	330ohm	J 1/16W
R706	24872681	Res,Chip	680ohm	J 1/16W
R707	24872272	Res,Chip	2.7kohm	J 1/16W
R708	24872333	Res,Chip	33kohm	J 1/16W
R709	24872562	Res,Chip	5.6kohm	J 1/16W
R710	24872123	Res,Chip	12kohm	J 1/16W
R711	24872334	Res,Chip	330kohm	J 1/16W
R712	24872241	Res,Chip	240ohm	J 1/16W
R713	24872682	Res,Chip	6.8kohm	J 1/16W
R716	24872333	Res,Chip	33kohm	J 1/16W
R717	24872273	Res,Chip	27kohm	J 1/16W
R718	24872273	Res,Chip	27kohm	J 1/16W
R719	24872103	Res,Chip	10kohm	J 1/16W
R770	24872101	Res,Chip	100ohm	J 1/16W
R771	24872363	Res,Chip	36kohm	J 1/16W
R772	24366229	Res,Carbon	2.2ohm	J 1/6W
R773	24872682	Res,Chip	6.8kohm	J 1/16W
R774	24872102	Res,Chip	1kohm	J 1/16W
R775	24872122	Res,Chip	1.2kohm	J 1/16W
R776	24872222	Res,Chip	2.2kohm	J 1/16W
R777	24872222	Res,Chip	2.2kohm	J 1/16W
R778	24872152	Res,Chip	1.5kohm	J 1/16W
! R801	70424086	Res,Composition	3.3Mohm	K 1/2W
R802	24366514	Res,Carbon	510kohm	J 1/6W
R803	24383333	Res,Oxide Metal	33kohm	J 2W
R804	24383391	Res,Oxide Metal	390ohm	J 2W
R806	24366511	Res,Carbon	510ohm	J 1/6W
R807	24366101	Res,Carbon	100ohm	J 1/6W
R808	24366202	Res,Carbon	2kohm	J 1/6W
R809	24366682	Res,Carbon	6.8kohm	J 1/6W
! R810	24322278	Res,Metal	0.27ohm	J 1W
R811	24366913	Res,Carbon	91kohm	J 1/6W
R812	24366101	Res,Carbon	100ohm	J 1/6W
R814	24366101	Res,Carbon	100ohm	J 1/6W
R815	24366155	Res,Carbon	1.5Mohm	J 1/6W
R821	24367472	Res,Carbon	4.7kohm	G 1/6W
R822	24367102	Res,Carbon	1kohm	G 1/6W
R823	24366271	Res,Carbon	270ohm	J 1/6W
R824	24366182	Res,Carbon	1.8kohm	J 1/6W
R834	24366122	Res,Carbon	1.2kohm	J 1/6W
R840	24871223	Res,Chip	22kohm	J 1/8W
R841	24871472	Res,Chip	4.7kohm	J 1/8W
R842	24366103	Res,Carbon	10kohm	J 1/6W
R844	24366621	Res,Carbon	620ohm	J 1/6W
R845	24366103	Res,Carbon	10kohm	J 1/6W
R846	24871122	Res,Chip	1.2kohm	J 1/8W
R848	24871104	Res,Chip	100kohm	J 1/8W
R870	24376473	Res,Carbon	47kohm	J 1/2W
R871	24366512	Res,Carbon	5.1kohm	J 1/6W
R920	24872562	Res,Chip	5.6kohm	J 1/16W
R921	24872562	Res,Chip	5.6kohm	J 1/16W
R922	24872272	Res,Chip	2.7kohm	J 1/16W
R923	24872272	Res,Chip	2.7kohm	J 1/16W

	LOCATION NUMBER	PART NUMBER	DESCRIPTION		
	R924	24872332	Res,Chip	3.3kohm	J 1/16W
	R925	24872332	Res,Chip	3.3kohm	J 1/16W
	R926	24872272	Res,Chip	2.7kohm	J 1/16W
	R927	24872272	Res,Chip	2.7kohm	J 1/16W
	R928	24872273	Res,Chip	27kohm	J 1/16W
	R929	24872153	Res,Chip	15kohm	J 1/16W
	R936	24872821	Res,Chip	820ohm	J 1/16W
	R937	24872821	Res,Chip	820ohm	J 1/16W
	RD01	24872102	Res,Chip	1kohm	J 1/16W
	RD02	24872103	Res,Chip	10kohm	J 1/16W
	RD03	24872163	Res,Chip	16kohm	J 1/16W
	RD04	24872683	Res,Chip	68kohm	J 1/16W
	RD05	24872302	Res,Chip	3kohm	J 1/16W
	RD06	24872512	Res,Chip	5.1kohm	J 1/16W
	RD07	70420174	Res	16.6kohm	F 1/10W
	RD08	24000824	Chip Jumper		
	RE10	24871102	Res,Chip	1kohm	J 1/8W
!	RF827	24531221	Res,Fusible	220ohm	J 1/2W
!	RF841	24546229	Res,Fuse	2.2ohm	J 1/2W
	RF90	24872273	Res,Chip	27kohm	J 1/16W
	RF91	24872273	Res,Chip	27kohm	J 1/16W
	RF92	24871333	Res,Chip	33kohm	J 1/8W
	RF93	24871333	Res,Chip	33kohm	J 1/8W
	RH11	24366272	Res,Carbon	2.7kohm	J 1/6W
	RH12	24366272	Res,Carbon	2.7kohm	J 1/6W
	RH13	24872103	Res,Chip	10kohm	J 1/16W
	RH14	24871103	Res,Chip	10kohm	J 1/8W
	RJ001	24000824	Chip Jumper		
	RJ201	24000824	Chip Jumper		
	RJ501	24000824	Chip Jumper		
	RL11	24872182	Res,Chip	1.8kohm	J 1/16W
	RL12	24872472	Res,Chip	4.7kohm	J 1/16W
	RL13	24872103	Res,Chip	10kohm	J 1/16W
	RL14	24872472	Res,Chip	4.7kohm	J 1/16W
	RL15	24872472	Res,Chip	4.7kohm	J 1/16W
	RL16	24872103	Res,Chip	10kohm	J 1/16W
	RL18	24872821	Res,Chip	820ohm	J 1/16W
	RL21	24366392	Res,Carbon	3.9kohm	J 1/6W
	RL22	24872222	Res,Chip	2.2kohm	J 1/16W
	RL23	24872392	Res,Chip	3.9kohm	J 1/16W
	RL24	24872101	Res,Chip	100ohm	J 1/16W
	RX02	24366222	Res,Carbon	2.2kohm	J 1/6W
	RX05	24366470	Res,Carbon	47ohm	J 1/6W
	RX10	24366222	Res,Carbon	2.2kohm	J 1/6W
	RX11	24872151	Res,Chip	150ohm	J 1/16W
	RX12	24872221	Res,Chip	220ohm	J 1/16W
	RX13	24872331	Res,Chip	330ohm	J 1/16W
	RX14	24871471	Res,Chip	470ohm	J 1/8W
	RX15	24366821	Res,Carbon	820ohm	J 1/6W
	RX16	24872182	Res,Chip	1.8kohm	J 1/16W
	RX17	24871682	Res,Chip	6.8kohm	J 1/8W
	RX21	24872151	Res,Chip	150ohm	J 1/16W
	RX22	24872221	Res,Chip	220ohm	J 1/16W
	RX23	24872331	Res,Chip	330ohm	J 1/16W
	RX24	24871471	Res,Chip	470ohm	J 1/8W
	RX25	24366821	Res,Carbon	820ohm	J 1/6W
	RX26	24872182	Res,Chip	1.8kohm	J 1/16W
	RX27	24871682	Res,Chip	6.8kohm	J 1/8W
	RX30	24872472	Res,Chip	4.7kohm	J 1/16W
	RX31	24872122	Res,Chip	1.2kohm	J 1/16W
	RX35	24872472	Res,Chip	4.7kohm	J 1/16W
	RX36	24872472	Res,Chip	4.7kohm	J 1/16W
	RX37	24000824	Chip Jumper		
	RX38	24000824	Chip Jumper		
	RX73	70422053	Res,Oxide Metal	7.5ohm	J 1/2W
			- MISCELLANEOUS -		
	D601A	70361689	Holder		
!	F801	23144558	Fuse	1.25A,125V	
	F801A	23165102	Fuse Holder		
!	F802	23144581	Fuse	0.2A,125V	
!	H001	70121874	Tuner	TMDH2	
	P102	23164506	Plug 2P		
	P502	23368639	Plug	10P	
	P702	23903032	Socket	2P	
!	P801	70175915	Power Cord	10A, 125V	
	P990	23365940	Phono Jack	6P	
	Q601A	70361714	Holder		
	Q602A	70361714	Holder		
	Q801B	70391355	Screw	3x8mm	
	S001	23344082	Switch,Slide		
	S602	70145505	Leaf Switch	1C1P	
	S610	70145494	Switch,Cam		

	LOCATION NUMBER	PART NUMBER	DESCRIPTION	
	SX01	70145487	Push Switch	
	SX02	70145487	Push Switch	
	SX04	70145487	Push Switch	
	SX08	70145487	Push Switch	
	SX10	70145487	Push Switch	
	SX11	70145487	Push Switch	
!	T801	23211691	Line Filter	TRF3213
!	T802	70213246	Converter Transformer	
	W701	70175750	Wire	FFC,7P,L120
	W701A	23902358	Connector,FFC,7P	
	X401	23153359	Crystal	3.579545MHz
	X501	23153409	Crystal	16MHz
	X502	70153690	Crystal	32.768MHz
	Z601	70200448	Photo Interrupter	GP1S566
	Z602	70200448	Photo Interrupter	GP1S566
	Z661	70125758	Stator	
	Z662	70114368	Hall Sensor	HW300B
	Z662A	70869627	Holder	
	ZX01	70113184	FIP	25U39149
	ZX02	70110201	F.U.	GP1U291Q

TOSHIBA VIDEO PRODUCTS PTE. LTD.
438B ALEXANDRA ROAD BLOCK B#06-01 ALEXANDRA TECHNOPARK SINGAPORE 119968